FOOD INDUSTRIES

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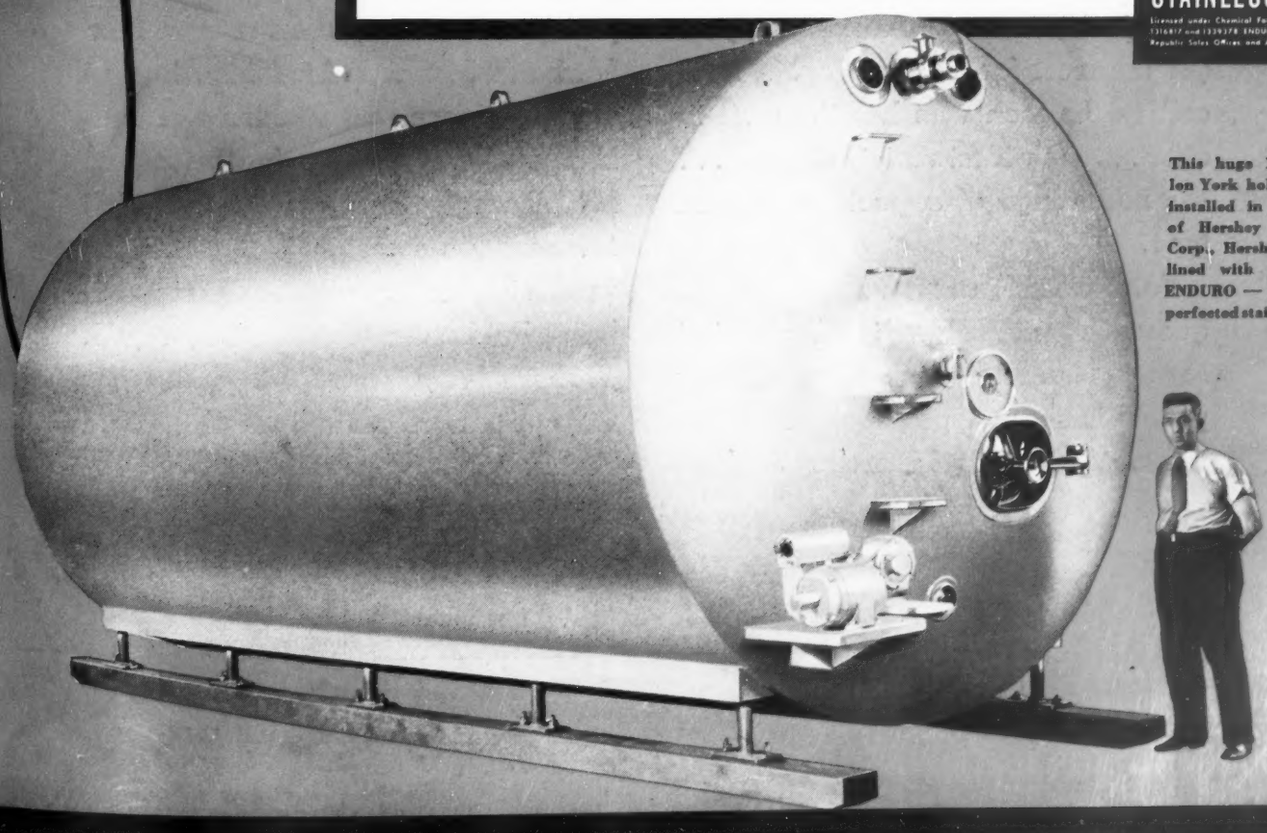

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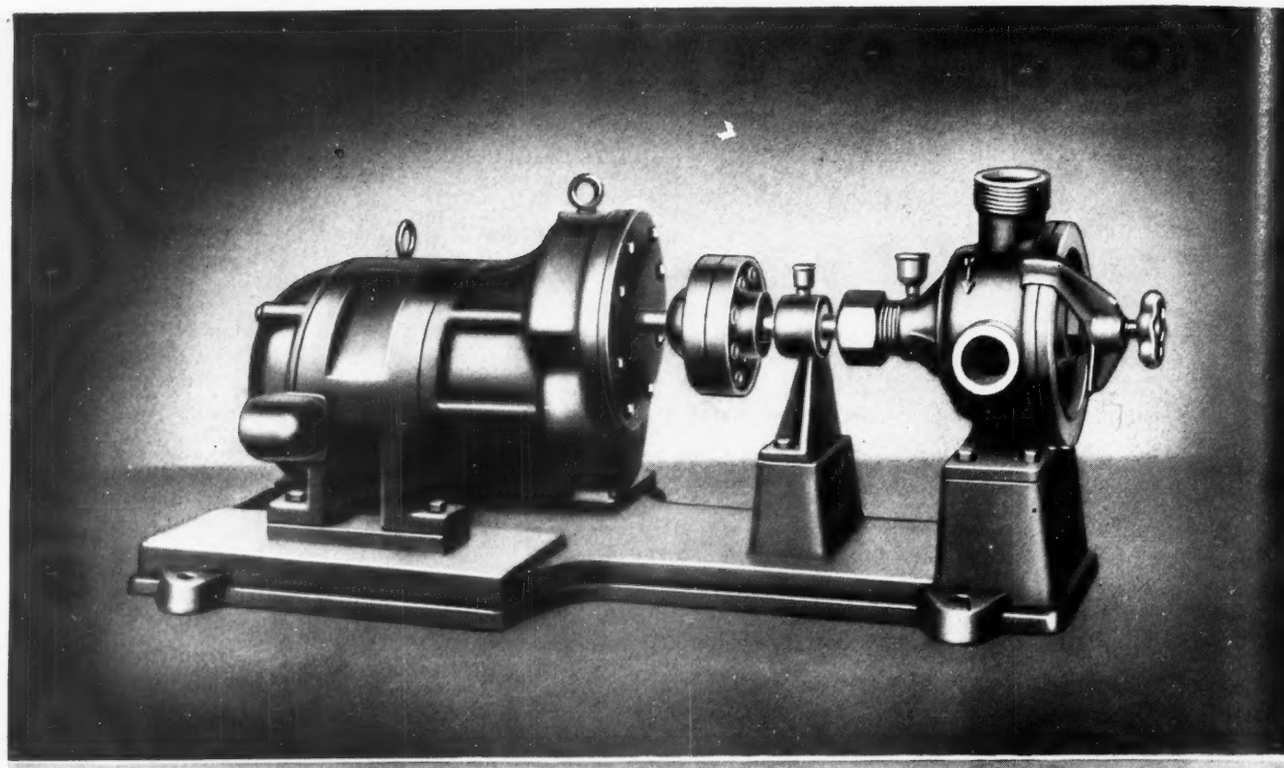

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Pumps

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for

September, 1936

Volume 8, Number 9

FOOD INDUSTRIES

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Self-contained refrigerating systems are capable of maintaining predetermined inside body temperatures for 24 hours or more. Motor Carrier Act is stabilizing rates.

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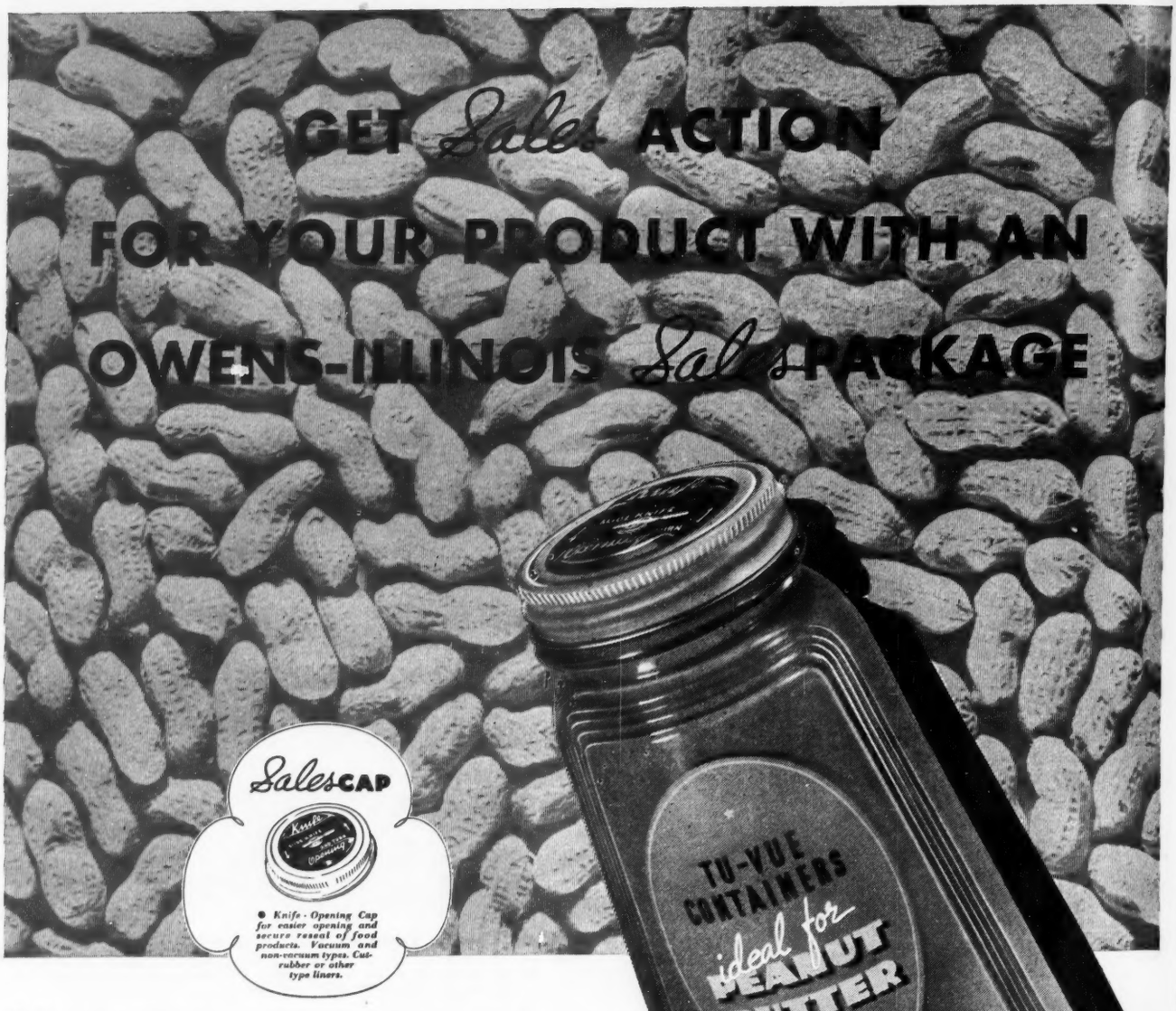
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FOOD INDUSTRIES

PRODUCTION • ENGINEERING • DISTRIBUTION

Established 1928—McGraw-Hill Publishing Company, Inc.

Vol. 8, No. 9

Laurence V. Burton, Editor

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SEPTEMBER 1936

THE TALK OF THE INDUSTRY

AN ESTIMABLE North American lady once toured South America under conditions that gave her entree to the most fashionable and wealthy circles. Her comment after the tour was that the South Americans are entirely too interested in their food. At a succession of some 60 formal dinner parties in many countries her dinner partners made a very serious business of their eating. Conversation was very limited.

It was a mystery to us then, but now we can understand. In the 1936 Reference Book of the Meat Packing Industry we have discovered the reason. Per capita consumption of beef and veal in Argentina is 253 compared to 69 lb. in United States.

Who wouldn't take his meals more seriously if he had a chance to eat beef four times as often as we in this country?

WE DON'T want to worry you, but we are informed that, in the next session of Congress, an important new law will be proposed. It will outdo the Robinson-Patman Act.

The present draft of the new bill is designed to prohibit any distributor from operating any manufacturing establishments. The idea is that no chain store or wholesale grocer may own or lease a factory.

If the Robinson-Patman Act is a good law, which is debatable, then the next logical step would be to prohibit distributors from owning any production facilities. But we wonder what would happen to dairies, meat packers, big bakers, certain large canners and confectioners under such a prohibition. Yet their troubles would be nothing compared to Standard Brands' problems.

Yes, indeed, 1937 ought to be a very interesting year.

A LOT OF PEOPLE in the food industries are due for a very severe shock. A lot of them are going to find that they are very bum guessers. Or else they are poorly advised, which is just as bad.

Some executives assert that the new Robinson-Patman Law will cause business to undergo a revolutionary change. Others assert that interstate business will be done about as usual. They don't expect any changes.

Obviously, it cannot be both. Somebody is dead wrong. And the chap who is wrong is going to lose money for his company.

LIFE is growing more complex every day. Sex hormones, says Dr. Herman Bach, a German organic chemist, in *Engineering News-Record*, are an influence in shaping plant growths fertilized with sewage sludge. He claims that artificial fertilizers, although rich in mineral constituents, cannot compete with domestic sewage which is poor in plant nutrients but rich in stimulating values.

Consider the possibility that this opens up. Why does not some enterprising group form a corporation to corral the sewage of a prosperous large city?

By suitable colloidal adsorption method, they could recover the sex hormones. And if the concentrates are as potent, as Dr. Herman Bach indicates they are, any self-respecting fertilizer company would be willing to pay handsomely for them.

And then, after a nice business has been worked up, the Concentrated Sex Hormones Company could shake down the AAA for a sweet sum for not producing the plant stimulating growth. There ought to be millions in it.

THE annonymous letter writer is again rearing his ugly head. This time somebody is asking us to make public our salary.

You wouldn't want us to interfere with the S.E.C. would you, Mister?

DURING the coming months you will hear some pretty strong language on matters political. It will come from people around about you.

If you want to find out exactly the amount of conviction behind speakers of strong words, try to get them to donate a few dollars to the "war chest" of the party they seem to favor. Or try to get them to sign an official pledge to contribute the money later on.

Of course, many cannot afford to contribute. But when you meet downright refusals, ask them to donate to the other political party. They won't do that either.

The net effect is something like going through a period of serious trouble. You discover some of the

frailties of human nature. It's something like it was back in 1917 and 1918. The blood-thirsty swashbucklers, who would like to cut up every German into mince meat, did not enlist.

THEY DO SAY, down in Washington (D. C.), that the principal beneficiary of the Robinson-Patman Law is the lawyer who wrote most of it. A very quiet little man is he. Rather likeable, in fact.

Right now people are standing in line to get a chance to buy his advice. He is supposed to know more about how to "comply" with the law than anybody else.

SO Secretary Morganthau says there will not be any need for more taxes in 1937. Maybe he is right. The last Congress passed a tax law that will take care of 1937 very nicely, thank you.

And then the Social Security Taxes will soon start rolling in. You don't suppose the astute Secretary of Treasury is looking knowingly at them, do you?

What Are You Doing About the World's Fair?

FOR two months we have waited for a peep from the food industries on our proposal for working exhibits at the 1939 World's Fair in New York.

Business of awarding ourselves the well-known goose egg, with the palm to boot. Up to now we have heard exactly nothing.

In 1939, we want to see a dozen or more small food manufacturing plants in full operation at the World's Fair. This is not a job for the individual company. It should be done by the various associations.

The time to plan for it is right now. The first step is to decide what part of your business is the most fascinating to the public. That operation is the one that should be featured. It should be in the most readily visible part of the exhibit.

To find this out, keep an accurate record of what the lay public stares at longest when it goes through your plant. You will find out that it is seldom a very important operation as far as fundamentals go.

In a canning plant it is the can-closing machine and the labeling machine that holds the spectator in wrapt attention.

In a macaroni plant it is the macaroni press or the noodle brake that draws the crowd. They want to see how the hole is put in the macaroni. In an ice cream plant it is the automatic packaging operation—especially if it is a three-flavored job. And so it goes.

Humanity loves to watch motion—action. Give them a treat. Show them what you are doing for the housewife by doing it right before their eyes. Panoramas and dioramas, pictures, paintings, etc. are the bunk. Give them action. Start now.

Invention Needed

TROUBLES of the fluid milk companies in the thickly populated areas of the country are growing rapidly. Farmers demand more for their milk while consumers demand their milk at lower or, at least no higher, prices. Certain consumer organizations in the East accuse the dairy companies of gross inefficiency.

For the immediate cause of the rumpus one need look no further than the 1936 drought. Yet back of that is a much more fundamental problem. If it can be solved, all the factors involved, farmers, consumers and dairy companies will be much happier.

The real touble is that milk is the second most perishable food. Fresh milk now has an average merchantable life of about five days. It has to be sold and consumed *pronto*, or else it must be manufactured into something else.

Just as soon as a satisfactory

Hors d'Oeuvres

• *Wrigley has discontinued all forms of advertising in Kentucky because the sale of chewing gum there has been almost at a standstill since the state put a sales tax on the product. Apparently consumers can't swallow the tax.*

• Brewers did almost 19 per cent more business in the first six months of this year than in the same period of 1935, and 1936 looks like a 53,000,000-bbl. year. Business is so good, in fact, that the brewers can afford to fight among themselves instead of working together to further the interests of the industry.

• *Part of the building housing New York's famous Fulton fish market, where Al Smith made his start, recently collapsed. Wonder if this could be symbolic of recent developments in Mr. Smith's political career?*

• John L. Martin, "Pepper" Martin to us baseball fans, has been made president of Fruit-Cereal Ice Cream Co., Inc., St. Louis. Perhaps it's cheaper to give sponsors of your product positions with the company than to pay them for testimonials.

• *"Drunk for a penny, dead drunk for twopence, clean straw for nothing." This sign hung outside an old English tavern in 1793, says the Gentleman's Magazine of that year. Alcoholic beverages must have been plentiful and bouncers very scarce.*

• We never cease to marvel at the effectiveness with which advertising men use the feminine figure to attract attention. We have just seen a promotional piece for a shaker-type sieve, a thoroughly unromantic mechanism. The "stopper" is a Hawaiian dancer in a grass skirt. The slogan, "It has a motion all its own." Sure, we looked at it—the sieve.

• *Jay Hormel, president of Geo. A. Hormel & Co., recently advocated a high-wage, short-week plan for bolstering business. We think executives ought to give this careful consideration and keep it in reserve until the business curve again heads for the gutter and we need a lift to that corner around which prosperity hides.*

• Perhaps few candy manufacturers care why the ladies like rich confections, so long as they eat them. But as a matter of academic interest we report that one of the richest and most delicious confections is the zujak served in the Turkish harem. And we are told that this has other effects than appeasing the appetite.

• *Washington berry growers watched millions of dollars in big, juicy berries rot on the bushes this summer because pickers refused to be pried loose from relief rolls. We don't blame the pickers. We don't like to work, either.*

method is discovered of holding milk fresh for a long period of time, say four or five months, a lot of this senseless, unfair and pointless fighting about the right price for milk will stop.

In the meantime, let the professional consumers be warned. The distribution "efficiency" which they so much admire is coming. It is to be hoped that the professional consumers will like it. It is to be hoped that they will realize who pays the cost of such progress. Once it is here there will be no backing up. It will be impossible to go back to the good old days of 1936.

The real cost of improved distribution efficiency is huge permanent loss of jobs for somebody. Without question this will occur, whether it comes via the route of a practical way to take milk out of the perishable class or by more prosaic methods. Nevertheless the new method of preservation is one that is greatly needed.

Halbran Photo

FOOD PROCESSING MOVES INTO THE GROCERY STORE

Coffee companies are wondering if this new development will duplicate the experience of the store-counter ice-cream freezer. This electrically operated machine will automatically roast, clean and cool an 11-lb. charge of any blend of green coffee. The young lady places the sealed paper container of green coffee in the monitor top drawer and closes it. That starts the cycle of operations. When the signal lights go out she finds the fresh roasted coffee in the bottom drawer.

United Front Needed

SOME DAY the millenium will come. Some day everybody in the country will be conscious of the existence of a food industry—even the food manufacturers themselves. Today there is greater need for industry-wide consciousness than ever before.

In addition to the scientific, technical, operating, raw material, distribution, merchandising, advertising and selling problems, that are common to all food manufacturers, the industry is now facing serious legislative problems. It is impossible to gage the far-reaching consequences of the problems created by recent legislation or by bills that are to be presented to the next session of Congress.

The first step toward a united front is thinking straight. If people associated with the food industries don't think in terms of a food industry, how can we expect outsiders to think that way?

How to Develop Loyalty

LIKE friendship, loyalty is not a one-way proposition. One man cannot be a friend unless the other fellow is also a friend. Loyalty works in the same way. Employees are loyal to the company when the company is loyal to them.

Loyalty is nothing but a form of friendship and respect, deep-seated and enduring, between the individual and the whole organization. It is a very valuable asset.

To the employee, the corporation executives and sub-executives are symbols for the company. He looks to their attitude for the keynote. If they are friendly, take an interest, look out for his welfare, help him in his hour of need, counsel with him when he is troubled, and are honest and fair with him, he will feel the same way toward his company. He can't help it.

Pep meetings, exhortations, educational campaigns are pretty weak substitutes for loyalty to employees. Friendship, cannot be built up in a day. It grows slowly, and it feeds on pleasant memories. So does loyalty.

Industry Must Defend Itself

INDUSTRY has not yet learned to defend itself. It's time to begin. The future will see more and more unjustified attacks on industry. The attacks will come from left-wing minds and somewhat immature economists.

Their weapons of attack are misinterpreted statistics, partial statistics, half-truths. Also they use logical arguments based on false premises.

The defense against such attacks are facts that reveal the whole truth and nothing but the truth. But the truth is hidden in statistics and figures—figures that are dry as dust. Always it is a tough job to dig out the truth. Yet it has to be done if industry is to defend itself against misrepresentation and unfair attacks.

The whole job has been done for industry by the McGraw-Hill Publishing Company. In the August issue of *Factory* you will find all the ammunition you need. All pertinent data has been assembled. And it is presented in a pictorial manner that the busiest executive or the humblest worker can grasp at a glance.

Here is found an inexhaustible storehouse of ammunition. It should be used aggressively to tell the country what industry has done for it.

"Wet Process" Solves Problems in Packing and Transporting Frozen Foods

By A. B. HASLACHER

President, "Fresh-N-Ice" Process Foods
San Francisco, Calif.

NEW DEVELOPMENTS in technique in the wet process of freezing foods warrant speculation as to the ultimate possibilities of wide scale distribution of fresh foodstuffs preserved in this fashion. Experimental work carried on since 1924 by the writer, coupled with three years of commercial operation during which the process has been further perfected, indicate certain inherent advantages for the wet process. These include elimination of problems incident to dehydration and oxidation. They also give ruggedness to the finished product as regards storage and transportation. Experience has shown that the increase in weight of the frozen product, due to the presence of ice, is more than offset by these advantages.

Our technique employs "gentle" rather than quick freezing. It may be done in a "sharp" room or in brine tanks at 8 to 10 deg. F. Because of this latter fact, the freezing may be accomplished in any commercial ice plant where brine tank capacity is available. Developed for this purpose is a holder consisting of a series of metal tubes of diameters suitable for receiving either quart or gallon Sealright containers, which are attached to a metal frame having the same dimensions as the cover of an ordinary ice can. This permits handling on a conveyor system in the same manner as ice cans. *Freezing is accomplished in six hours in the case of the smaller diameter containers and 24 hours for the larger.*

Peas, string beans, cauliflower, spinach, Brussels sprouts and broccoli packed in water, and rhubarb, figs, peaches and berries packed in simple syrup have been marketed to institutions, hotels, clubs, and steamship lines under the trade name "Fresh-N-Ice" for the last three years. Most recent customers are the U. S. Navy, the Pan-American Airlines for its operating bases at Guam and Wake in mid-Pacific, and the foreign colonies in such Oriental cities as Shanghai and Hong Kong.

▶***This new wet-freezing method of slow freezing foods is a competitor of quick freezing. It revives the controversy about the merits of quick vs. slow freezing which raged about six years ago.***

The wet-freezing method is of direct manufacturing and distributing interest to those having to do with

Quick freezing
Canning
Meats
Raw fruits and vegetables
Ice Cream
Dairies
Ice Manufacture
Breweries having surplus ice making capacity
Produce Handling

Processing includes preparation, grading and blanching to inactivate the enzymes. The blanching heightens the color as is well known to canners. But contrary to the experience of canners with sterilized canned foods, the color remains bright all during the frozen storage period. The products are then placed in pint, quart or gallon containers and then water or simple syrup is added. A patented feature of the packing now occurs. This consists of the insertion of a "depressor" into the container for the purpose of keeping the fruit or vegetables below the level of the liquid to prevent oxidization which might occur in the presence of free air. The depressor is a circular die-cut piece of waxed material of the same type used in the containers, (see Fig. 3). The edges are fluted to permit a tight fit and small holes are punched in it to allow for expansion of the liquid during freezing. (During the freezing process a cone-shaped cover of ice forms over the depressor.) The containers finally are covered and are then ready to insert in the freezing units.

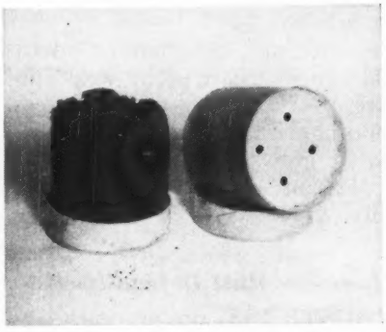


Fig. 2. Left: Frozen string beans. Right: A pint container with depressor in place.

In addition to the sizes mentioned, products are packed in 50-lb. blocks.

Despite the relatively higher temperatures used in the freezing, compared to other systems employing quick freezing, tests have shown that bacterial activity ceases within 30 minutes after the containers are immersed in brine. After freezing and subsequent removal from the brine, the freezing units are partially thawed in clear water to permit the containers to be emptied from them. The containers are then packed in cartons for storage at 10 deg. F. or for shipping.

Presence of the ice seal has been found advantageous in shipping. Because the process permits use of ordinary ice-making plants, packing may be done in many instances close to the fields from which the crops are obtained. Under normal Pacific Coast temperature conditions, shipment has been made by truck without refrigeration for 50 or more miles to storage points without damage to the product. Under conditions of widespread distribution, deliveries can be made from storage to stores, where the time interval during which the products are out of cold storage, is three hours or more.

As has been mentioned, the ruggedness of the solid pack precludes any damage to the contents due to rough handling. During winter

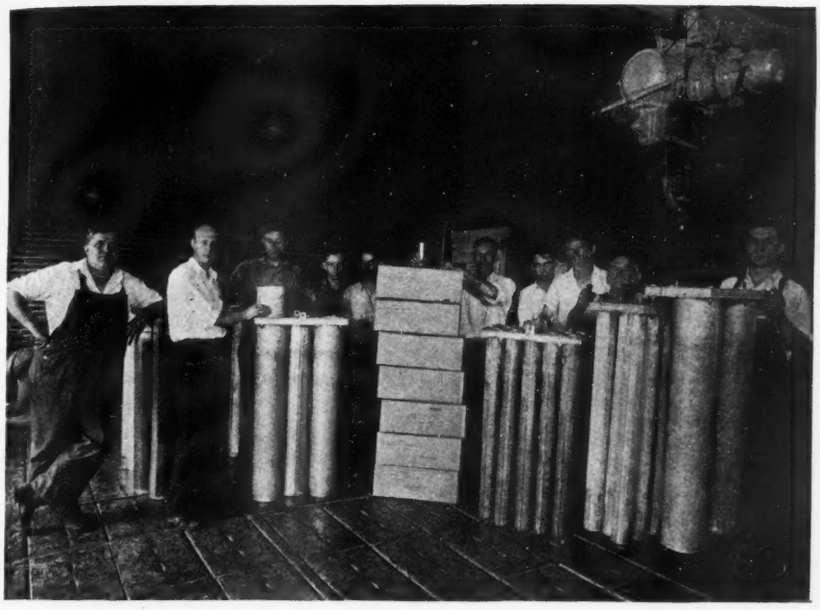


Fig. 1. Freezing units of the Haslacher process. The operation is conducted in an ordinary ice plant.

months shipments have been made from New York to Detroit in unrefrigerated trucks with no bad effects on the products. Upon receipt, the containers go into storage and are brought back to 10 deg. F. A low-cost, special refrigerated cabinet for storage and display at the point of sale has been developed and will be available if and when general distribution through retailers is effected.

Of special interest are the keeping qualities of wet-process frozen pack, once it has been purchased. Placed in the ordinary mechanical refrigerator with temperatures ranging from 40 to 50 deg. F., even after complete thawing, the vegetables have kept fresh and palatable for from three to five days. In the case of the vegetables, directions on the package instruct the user to cook the vegetables in the water in which they have been frozen so as to preserve the mineral salts and other solubles.

Successful experiments have been made with artichoke hearts, corn and lima beans, although the latter two are not included in the "Fresh-N-Ice" line on account of the unavailability of satisfactory varieties for packing in the Pacific Coast states.

Noteworthy are the experiments which have been conducted with freshly killed chickens. Broilers and fryers are killed, drawn and split down the back so as to permit packing flat. They are then washed and the cells sealed by a special process similar to blanching. They are packed six to the gallon container and 20 to 24, depending upon size, in a package 9x9x10 in. Employing this process it is possible to pack 96 birds in 2 cu.ft. Possible contamination of the meat, due to the presence of the entrails as in the case of cold storage birds, is positively eliminated. Chickens preserved a year or more by this process are as sweet and palatable as freshly killed birds.

Equipment has also been developed for freezing turkeys after they have been drawn.

Fresh pineapple is another fruit which has been the subject of successful experiments. It has been found to be particularly adaptable to the wet-process due to its structure.

Ultimate field for frozen vegetables and fruits would appear to be based upon the degree of consumer acceptance which can be developed. Processing seems to have approached the point where successful results are assured. Costs are competitive with other types of preserved products of equal quality. Cost of raw material is the same as the canner pays the grower for equal grades; processing up to and including the packaging are the same; the container costs are equal; freezing compares in cost with cooking, is perhaps even slightly less. Storage costs favor canned products. However, average cold storage costs of 1 cent per pound per season or less may be obtained. Transportation problems for the frozen foods present no difficulties. Once assured of the freshness, palatability and quality of frozen foods, plus the added convenience, due to the fact they are ready for immediate use, the public may be expected to pay a premium during off seasons for the produce preserved by freezing.

On the economic side we have obtained the following operating figures. In gallon containers, the ratio of product to water, expressed in pounds of the typical product, is as follows:

Fig. 4. Top-opening display freezer cabinet.

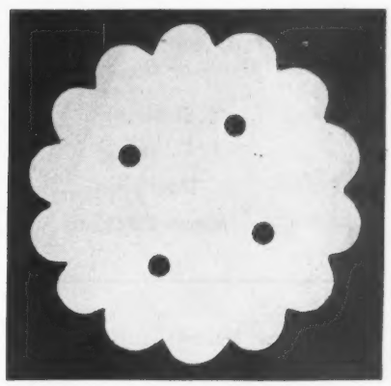


Fig. 3. A die-cut depressor flattened out.

	Wt. Material Lb.	*Wt. Water Lb.*
Spinach	6	2
Peas	6	2
Broccoli	5	3
String Beans	5	3
String Beans	4	4
Berries	5	3 (syrup)

Roughly, the amount of refrigeration required is about 10 per cent above the amount required to freeze the same weight of water.

Procedure to date has been to purchase the raw materials, wash and blanch them in a properly equipped canning factory. Then the products are filled into the container. Next they are trucked to an ice plant, inserted into our own freezing equipment, and placed in the freezing brine. The whole arrangement is very simple and easily handled.

Mr. Haslacher, at our request, has supplied us with the patent numbers covering the patented features of his process and equipment.

U. S. No. 1,586,898 issued June 1, 1926
U. S. No. 1,668,903 issued May 8, 1928
U. S. No. 1,947,082 issued February 13, 1934
U. S. No. 1,947,083 issued February 13, 1934
—Editor

Water Demand Reduced By 83 Per Cent

. . . *yet plenty for every service*

By L. V. Burton
Editor, Food Industries

Many a plant has reasons for using smaller amounts of water than normal. If 1934 and 1936 drought conditions persist in future years, it may behoove all to conserve their water. The water problem is one that is common to many plants in the following lines

Brewing
Canning
Dairying
Meat Packing

Before reading this article be sure to read the preceding article in your July number, "Four Kinds of Trouble Avoided By Using Less Water."

A FACTORY can usually be operated with very modest amounts of water if there is real need for it. In fact, the plant described here gets along very easily on about 16 per cent of the amount of water that would be normally used in the same operations.

The fact that this plant happens to be producing canned foods puts it in the class of big users of water. Here are some rough figures on average consumption of water for processing canned foods.

Approximate Water Consumption

Product	Unit	Gallons Required
Peas	24 No. 2 cans	24— 30
Corn	24 No. 2 cans	60— 80
Spinach	24 No. 2½ cans	100—200

Contrast the foregoing rough figures with 4 gal. of water per case of peas and 6 gal. of water per case of corn. These astonishingly low figures are obtained at the Holcomb, New York, plant of W. N. Clark Co.

Near the plant is a modest but very dependable supply of good water. It has never failed in over 200 years. All they need to do is keep the water consumption within the amount available.

To make it possible to produce a large volume of goods with the amount of water available is a job that was not solved over night. It took several years of study to learn how to live easily within its "income" of water.

About two-thirds of the water required in this plant is used for cleaning up after each day's run. That creates a big demand for a couple of hours—more than the famous springs will produce in that time. It requires a large reservoir. They have one that holds 5,000,000 gallons. Also they have a water tower for storage of softened water. The reservoir alone can run the plant for about six weeks or more.

In the general flow diagram of the water system (Fig. 1), the layout has been simplified. Where water is used in the food, as an ingredient (for brine), or for blanching, the water is drawn fresh from the springs. Then it is softened in a Permutit softener before using.

When the water is used for boiler feed, for cleaning the factory, or for cooling, it is drawn from the reservoir.

A centrifugal pump forces reservoir water through the pressure filter for boiler feed.

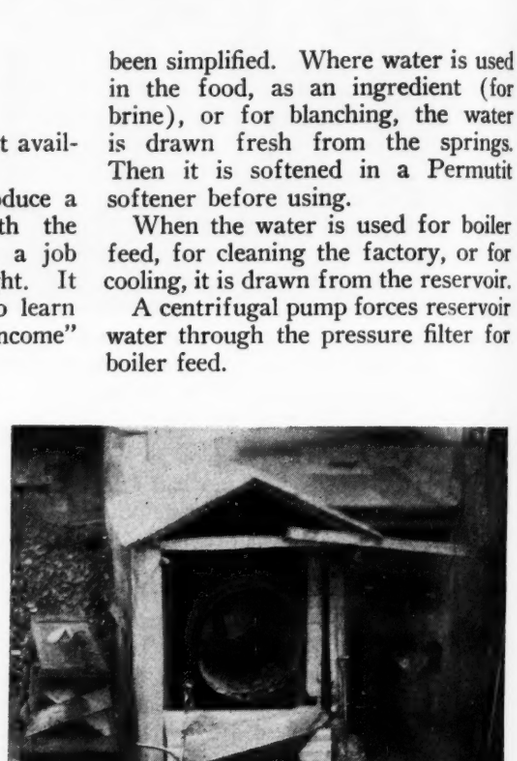


Fig. 3—This small stream of water is all that escapes to the sewers (except, of course, sanitary sewage from toilets)

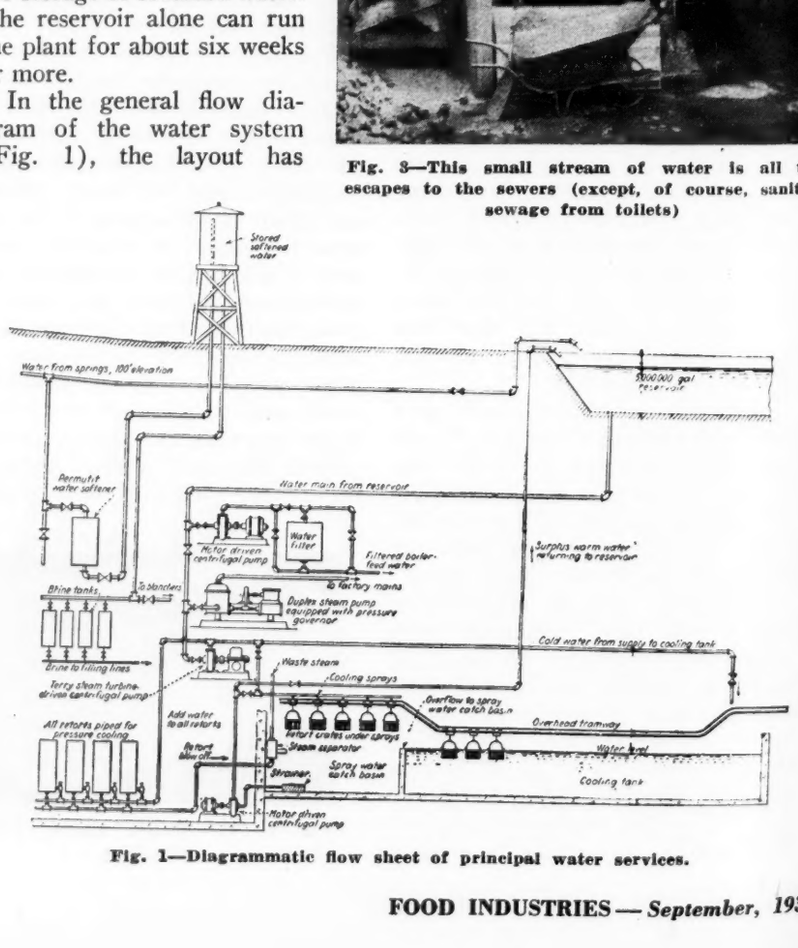


Fig. 1—Diagrammatic flow sheet of principal water services.

A duplex steam pump of the tank, or low-pressure type (contrasted to high-pressure boiler-feed pumps), supplies all the other factory services except cooling. These services include operation of washers, hoses, cleaning, etc.

Then there is another centrifugal pump, driven by a Terry steam turbine which pumps reservoir water to the cooling system. This system is very important. Canned foods are sterilized by heat in retorts. The cans come out of the retorts at a temperature of about 245 deg. F. And unless they are cooled promptly this residual heat will overcook them. Overcooked peas are perfectly good nutritious food, but the quality has slipped down a notch or two. Hence the need of adequate cooling.

A cooling system as ordinarily operated uses a tremendous amount of water. Most canning plants cool by dragging the crates of hot cans through a long tank of cold water—a method that takes lots of water. The Clark plant also does that, but it has a very ingenious method of saving all the resulting warm water and making it do, not double duty, but even triple duty.

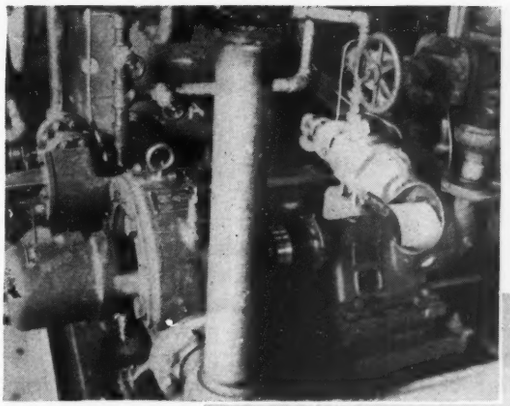


Fig. 4—These small pumps handle the boiler water and cooling water. One more evidence of economy.

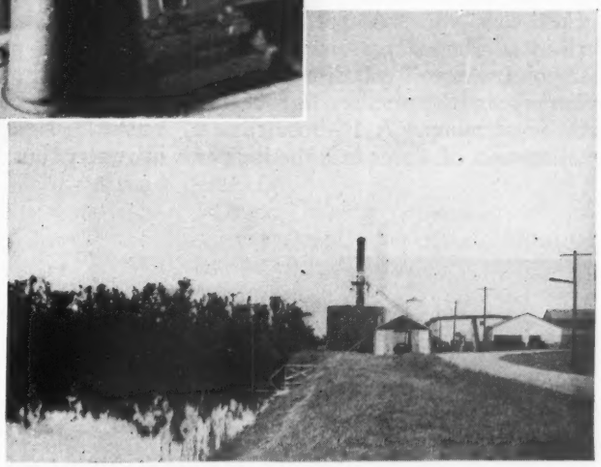


Fig. 5—Five million gallons of water ready at all times.

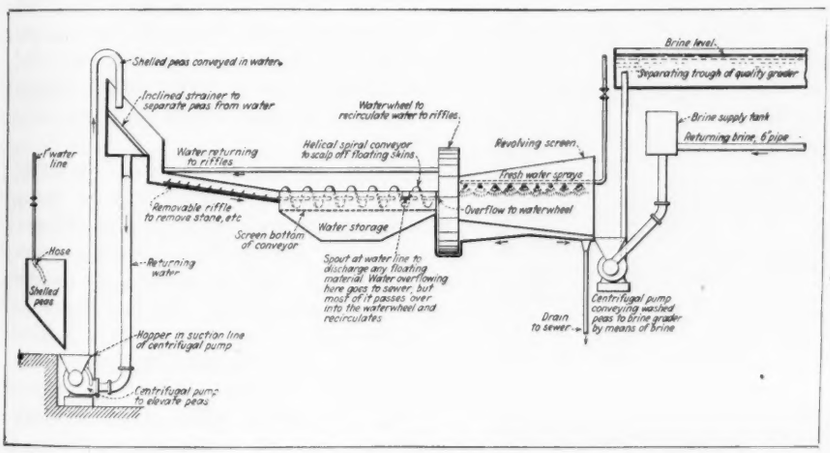

Shelled peas conveyed in water
Inclined strainer to separate peas from water
Water returning to riffles
Helical spiral conveyor to scalp off floating skins
Waterwheel to recirculate water to riffles
Revolving screen
Brine level
Separating trough of quality grader
Brine supply tank
Returning brine, 6" pipe
Fresh water sprays
Overflow to waterwheel
Water storage
Screen bottom of conveyor
Removable riffle to remove stone, etc.
Hose
Shelled peas
Returning water
Spout at water line to discharge any floating material. Water overflowing here goes to sewer, but most of it passes over into the waterwheel and recirculates
Centrifugal pump conveying washed peas to brine grader by means of brine
Drain to sewer
Hopper in suction line of centrifugal pump
Centrifugal pump to elevate peas

Fig. 2—Diagrammatic flow sheet for water used for conveying and washing the raw material.

Warm water overflows at the near end of the cooling tank into the spray water catch basin. Its temperature may be about 90 deg. F. Another centrifugal pump forces it into a spray pipe line where a part of it sprays onto the crates of hot cans. See Figs. 1 and 6. Enough of the warm water evaporates within 2 ft. to cool it down to about 65 deg. F. This does an excellent job of precooling the cans before they go to the cooling tank.

If there is more warm water than the sprays can take, it goes on back to the big reservoir. As long as it is clean water, it can reenter the cycle of manufacturing operations. This constitutes the biggest source of water economy. But it is not the only ingenious water economy.

When large cans, No. 10's, are sterilized, they must be cooled in the retorts under pressure to avoid buckling. Cooling water from the retorts is not wasted but is piped to a steam separator over the spray water catch basin. (See Fig. 6.) There the centrifugal pump picks it up and sends it back to the cooling spray lines or to the main reservoir. The blow off of condensate from retorts also goes to the same steam separator.

Not a drop is wasted anywhere. The only losses are those of evaporation which are beneficial because they cool the spray water.

In the preparation department, where the peas are washed and prepared for filling into cans, there is also displayed the same carefully planned ingenuity. Fig. 2 shows, in simplified form, how the water is reused efficiently. In the plant, under

Fig. 6—Precooling cans by spraying them with warm water. The steam arising roughly indicates the amount of heat that is absorbed. The gadget in the corner is the steam separator (See Fig. 1).

actual operating conditions, it is not as easily apparent as it is shown here. In the diagram everything has been straightened out into a line of operations.

Water is used to elevate the peas by pumping them through a motor driven Fairbanks-Morse "Trash Pump." This does two things. 1. It washes the peas. 2. It does not waste as much water as the usual bucket conveyor. A portable hopperload of shelled peas is moved up to a point where it will discharge into a hopper in the suction line of the centrifugal pump. A 1"–hose runs a small stream of water into the hopper to wet the peas, to make them slide more easily, and to make up the water lost on the wet peas going into the Olney pea washer in the next operation. The pump forces the peas and water up, dumps them onto an inclined screen that diverts the peas to the Olney washer but allows the water to return to the pump. Here is another economy.

Next the peas go to the Olney washer and meet a torrent of water that carries them over a set of riffles. (See Fig. 2.) Here any stones settle out. Then the peas go into another part of the machine where the water movement is very slow and gentle. At this point any skins or other floating material comes to the surface and is scalped off by a slow turning helical spiral conveyor. The floating material is washed out at a spout and into a basket strainer. The small amount of water escaping here goes to the sewers and is lost forever.

Next the peas move on into a revolving screen where they receive a spray of fresh water. The bottom of this part of the equipment is important. It is designed to drain the water back into a water wheel. This elevates it to a point where it runs back to meet the peas coming into the riffle. Also a part of the water from the scalper runs over into the water wheel and recirculates. Here is another economy, although it happens that Sprague-Sells Corporation, makers of the washer, provided this bit of ingenuity.

The peas are now all clean and washed. Next they are pumped, not in water but in brine, to another operation. (See Fig. 2.) No water or brine is lost here. Another economy. The peas are now in the brine quality-grader where tender peas are separated from the more mature ones. From this point on the operations are normal, as far as water economy is concerned, until the cooling operations begin. The latter have already been described at the outset of this article. Of course, the brine must be washed off the peas and the wash water is lost.

This systematic use and reuse of water has made it possible to operate a plant in a region that is a splendid source of raw material, but a region where the water must be used economically.

The method is to use the water over and over as long as it is clean. Outside of the spray cooling scheme, the plant pumps just as much water through its various operations as any other canning plant. In fact it pumps more water than many plants I have visited. But considering water consumption as the amount of spring water received, this plant has the lowest rate of water consumption I have ever seen in this kind of work.

To Mr. J. F. Birdsall, Superintendent, and his assistant, Mr. G. L. Gilbert, should go most of the credit for solving these problems of water economy.

Four Kinds of Trouble Can Be Avoided By Using Less Water

1. ***Floor drains and factory sewers too small.***
2. ***Outlet sewers too small.***
3. ***Stream pollution (can be minimized).***
4. ***Limited water supply.***

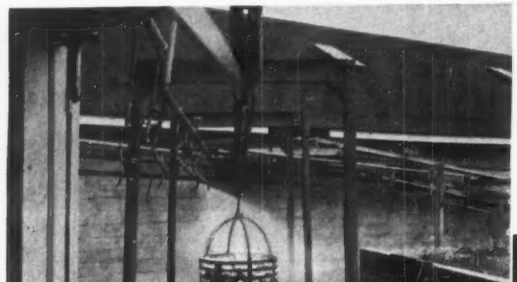
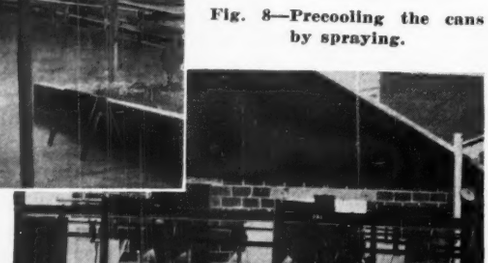


Fig. 7—Showing sprays in action. Drainage is to the catch basin next to building.

Fig. 8—Precooling the cans by spraying.



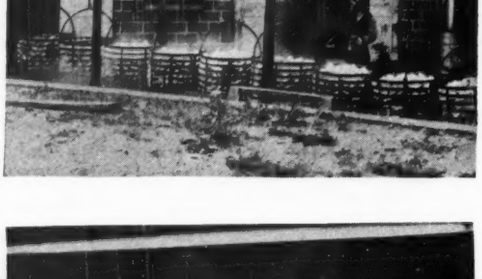


Fig. 9—Crates of cans on overhead tramrail descending into cooling tanks.

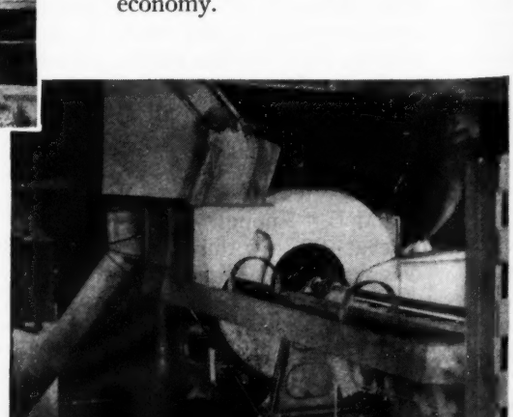


Fig. 10—Here is the Olney pea washer, an important factor in the water economy.

Accidents in Food Plants Increased During 1935

IN both frequency and severity of accidents the food industry had slightly higher rates during 1935 than in 1934, according to reports of the National Safety Council.

These reports have been assembled from 411 plants whose employees worked 263,079,000 man-hours. The 1935 average accident frequency rate of 15.52 (the number of disabling injuries per million man-hours of exposure) is 6 per cent above the rate for 1934. The corresponding average accident severity rate of 1.08 (the number of days lost per thousand man-hours of exposure) is 3 per cent above the 1934 rate.

A comparison with the average rates for 30 major industries shows that food companies rank nineteenth in frequency with a rate of 15.52 compared with 14.02 for all industries. In severity the rank is thirteenth with a rate of 1.08 compared with 1.58 for all industries, which means that food companies average 0.50 better in severity than the average of all industries. The number of disabling injuries has decreased 36 per cent since 1926 in comparison with a reduction of 61 per cent for all industries. Severity, for this period, however, is up 1 per cent against a reduction of 43 per cent for all industries.

Small plants had the lowest 1935 injury rates. However, large plants, on the whole, had the best records in comparison with 1934. Of the various branches of the industry, confectionery manufacturers had the lowest 1935 frequency rate, averaging 8.37; hotels and restaurants had the lowest severity, 0.25. Manufacturers of beverages made the best showing in comparison with 1934 by reducing frequency 38 per cent and severity 50 per cent.

Food manufacturers had better experience in severity than in frequency during 1935, when compared with other industries. Frequency is 11 per cent above the average for all industries; severity, however, is 32 per cent below. In the main, food companies have not kept pace with other industries in improving their injury experience. The reduction in frequency is 25 per cent less than the general decrease since 1926, and the food industry is one of the few industries that have not shown improvement in severity.

Reductions have been made in the frequency and severity of temporary and permanent partial disabilities since 1926 but fatalities have increased in frequency and this accounts for the small rise in the severity rate for injuries of all types.

	Frequency		Severity	
TYPE OF INJURY	1935 rate	Per cent change since 1926	1935 rate	Per cent change since 1926
Death and Permanent Total	00.06	+15	0.36	+15
Permanent Partial	00.75	—25	0.45	—14
Temporary	14.71	—37	0.27	—22
Total	15.52	—36	1.08	+ 1

Large plants had the highest 1935 injury rates and middle-sized units had the next worst records. There was a sharp increase over 1934 in the frequency rates of middle-sized plants. Only small units had higher severity rates in 1935.

Dairies had the highest 1935 frequency rates, averaging 25.71, and, with the exception of milling, they also had the highest severity rates. In comparison with other branches of the industry, rates also were high in sugar refineries and in beverage plants.

Frequency rates increased sharply over 1934 in sugar refineries, miscellaneous food products, and confectionery plants; severity rates were up appreciably in canning and preserving, milling, and sugar refineries.

During the last two years, companies having fatalities or permanent disabilities have been requested to make special reports on the circumstances involved in such injuries so that better information could be developed on the fundamental causes of serious accidents in the industry. Summary reports for the last two years have listed 452 serious injuries and 44 of these cases have been reported in detail.

Chance taking, disregard of instructions, and other wrong attitudes on the part of employees were involved in one-third of all serious injuries. Failure to follow instructions to shut off the power when performing certain tasks connected with the operation of machinery is one of the most common violations. Another important personal cause was "lack of knowledge or skill." This last cause of accidents is illustrated by laborer who lost four fingers in a feed mill when he attempted to learn the source of noises in some grinding equipment with which he was unfamiliar.

The following table gives a percentage distribution of the cases covered in recent one-year report from Illinois, New York, Maryland, New Jersey and Pennsylvania. Nearly all the cases in the report are covered by compensation.

INDUSTRIAL GROUP	1934–1935 Change in Frequency	1934–1935 Change in Severity
Food Industry as a whole	+ 6 per cent	+ 3 per cent
Beverages	— 38 " "	— 50 " "
Hotels and Restaurants	— 27 " "	— 32 " "
Milling	— 25 " "	+ 81 " "
Cereal Manufacturing	— 24 " "	+ 64 " "
Corn Products	— 20 " "	+ 16 " "
Dairy Products	+ 9 " "	— 1 " "
Canning and Preserving	+ 18 " "	+218 " "
Bakeries	+ 19 " "	— 26 " "
Confectionery	+ 21 " "	+ 42 " "
Other Food Products	+ 24 " "	— 74 " "
Sugar Refining	+394 " "	+ 78 " "

TYPE OF ACCIDENT	Per cent in All Industries	Per cent in Food Industry
All types	100.0	100.0
Handling objects	25.9	28.9
Falls to a different level	8.7	8.1
Falls to the same level	9.5	12.8
Machinery	12.0	14.3
Vehicles	10.9	9.6
Using hand tools	7.6	5.3
Falling objects	8.7	3.8
Stepping on or striking against objects	5.6	6.0
Electricity, explosives, heat	3.6	4.3
Harmful substances	2.1	2.1
Other	5.4	4.8

The Process of Aging or Maturing Wines

By M. A. JOSLYN

Fruit Products Division, University of California
Berkeley, Calif.

▶***What takes place during the unit process called aging is seldom thoroughly understood, regardless of what product is aged.***

All of the following have aging problems:

Beer
Wine
Flour
Cheese
Syrups for Carbonated Beverages

Refrigerating room of the Padre Vineyard Co., at Cucamonga, Calif.

THE mellowing of wine by aging is an important and an integral or essential step in the process of wine making. The process of aging consists essentially in the elimination of undesirable substances—suspended yeast cells and other organic matter, carbon dioxide gas, cream of tartar, excess tannin, etc.—and the formation of aromatic compounds particularly agreeable to taste and smell. As it ages, sound wine under suitable conditions becomes mellow and smooth, loses its early harshness, and forms a bouquet more complex and delicate than the simple fruity fragrance of a new wine.

The natural aging of wine, unlike that of some other alcoholic beverages, is not merely a storage process. The wine is separated from the material precipitated in storage by siphoning or pumping it from one vat to another. Frequently sumps are used to facilitate this racking, as this operation is called, particularly in the early stages. Furthermore the vats are periodically refilled to avoid the undesirable changes occurring in the presence of free oxygen. The dry wine is more susceptible to spoiling and requires more care than does the sweet, fortified wine.

Natural Aging of Wine

The aging of wine occurs in two stages, first the aging in the cask and then aging in the bottle. Wine drawn from the fermenter into the storage vat still contains fermentable sugar and its fermentation is completed in storage. As fermentation draws to a close, the yeast cells settle down, carrying with them various other substances, including cream of tartar crystals thrown out of solution by the alcohol. The wine is separated from the crude lees. These consist largely of organic matter together with a small amount of tartar crystals. They are separated by the operation known as racking.

Racking also facilitates the liberation of the carbon dioxide with which the new wine is supersaturated. More cream of tartar separates out during the later stages of storage, and more CO_2 is lost, particularly during the rackings. As the surplus carbon dioxide disappears, the wine absorbs oxygen and a partial oxidation of tannin and coloring materials occurs, followed by precipitation of the oxidized tannins. Other oxidized bodies are formed together with a small amount of esters, compounds of organic acids and alcohol. The wine absorbs oxygen largely during the racking although small amounts may be absorbed through the pores of the wood. Evaporation of wine in storage also aids the absorption by increasing the amount of oxygen that diffuses into the vat. It is estimated that during the normal period of aging, about three years, the wine may absorb a volume of oxygen equivalent to 10 per cent of its own volume. However, the extent of oxidation necessary depends on the reducing power of the wine as determined by its tannin and sulphite content among other factors. White wines must be protected from oxidation more than red wines and dry wines more than sweet wines.

Cask aging is largely an oxidation process, although esters are also formed. The formation of esters continues in the second stage—in the bottle.

The essential changes in composition during aging are: increase in ester content; slight increase in acetaldehyde content and acetal content; decrease in tannin and coloring matter; decrease in total acidity, largely as a result of loss of cream of tartar, although formation of esters is also involved in this decrease; a slight increase in volatile acid content, and lightening in color of red wines and slight yellowing of white wines.

Small Vats Help Aging

The slow oxidation of wine and the low rate of esterification under the ordinary storage conditions result in a slow natural aging. The kind of vat used for storage and the storage temperature are important factors in determining the rate of aging. It is well known that wine mellows more rapidly in smaller vats than in larger, possibly because of the more ready access of oxygen by diffusion. Oak is the preferred of all woods and oak ovals are prized even today as storage containers for wine. It is believed that the oak exerts a beneficial effect on the wine. Although the presence of certain oxidizing enzymes in wood was shown to aid the aging of saki, it is hardly probable that similar enzymes are present in the old and much used oak ovals. Furthermore, particular care is taken to remove all oak extractives from new containers for these would give the wine an unpleasant harsh flavor.

High or fluctuating storage temperatures are undesirable. Cool storage is necessary for the proper maturing of dry wines. It was for this reason that storage cellars have been hewed out of rock to obtain tunnels in which oak ovals could be placed at fairly constant atmospheric temperatures. A temperature of about 60 deg. F. is considered best. Insulated and, if necessary, refrigerated storage is desirable. Dry wines stored in the hot interior valleys of California are often chilled during the summer months to maintain them in a properly cool condition. Constant storage temperature is more important for the storage of bottled wines stoppered with corks, owing to the danger of excessive evaporation of wine occurring, as the cork stoppers are often not tight enough to prevent this.

Sound wine, made on a small scale and stored in small oak ovals of not over 1,000 gal. capacity, can be matured merely by the simple natural process outlined above. However, the maturation of wine in 20,000 to 30,000-gal. redwood vats with 3-in. staves or in the reinforced concrete storage vats that are now coming into wider use in California requires certain modification. Filtration, with or without fining for the more rapid removal of suspended matter, refrigeration for the more rapid removal of excess cream of tartar and pasteurization are processes that are widely used in the larger California wineries.

Aids to Aging

Fining is the clarification of wine by the addition of either inert material which, in settling through the wine, carries with it the suspended particles, or by addition of material which will form an insoluble precipitate by combining with one of the constituents of wine. The precipitate is flocculent and will carry with it the particles in suspension.

It is widely believed that the prompt removal of yeast cells from the new wine is desirable in order to avoid the liberation by the yeast cells of undesirable constituents—strongly reducing enzymes which inhibit oxidation of wine, other reducing substances like cysteine, and other cell contents. It has been pointed out recently in an Australian publication that wine made by cool fermentation under conditions at which all the yeast cells are alive is so low in nitrogen and potash content as not to support the growth of bacteria causing wine disease. However, the yeast cells on dying liberate their cell contents and make conditions again favorable to the growth of undesirable bacteria. It is for these reasons that rough filtration is often practiced particularly with wines that have been freshly fortified.

Giving wine a preliminary rough filtration in a Sweetland diatomaceous earth pressure filter in cellars of Shewan-Jones, Inc., Lodi, Calif.

Fortification of a partly fermented wine by adding a small amount of brandy results in a voluminous precipitation. Fining and filtration are often used to remove this material, particularly when storage space in the fortifying room is limited. On the other hand the wine in certain European wine districts is allowed to remain on the crude lees much longer than is the practice in California and the sound yeast lees is added to the wine after the first racking to aid its clearing and the production of desirable aromas.

Refrigeration for the removal of excess cream of tartar and certain colloids previously used just before bottling is now applied earlier particularly in the warm interior districts. There is still some difference of opinion as to the desirability of such treatment early in the maturity of wine.

Pasteurization in continuous flash pasteurizers at temperature of 185 deg. F. is practiced for the purpose of coagulating certain of the colloids present in wine. It is used also for bringing about a better blending of brandy and wine in fortified wine. In some cases the wine may be kept at fairly high temperatures for several days. Sauterne type wines are heated in oak barrels at 140 deg. F. for several days to improve them before bottling.

In making the California Sherry type wines, the process of heating the wine is very important. The desired flavor of Sherry type wines is developed by heating at 140 deg. F. for several months. The process consists of a combination of caramelization and oxidation to develop the so-called "rancio" or acetaldehyde flavor of the wine.

Refrigeration, aeration and pasteurization to hasten oxidation have been suggested and are practiced to

(*Turn to page* 449)

Researches That Made Gas Storage Possible

Part II

By NEIL R. FISK
London, England

▶*Gas storage of foods is a recent development in England. The new method has an important bearing on the future of the industries dealing in*

Meats **Eggs**
Fruits **Nuts**

TO understand easily the scientific principles underlying the recent use of carbon dioxide gas in the storage of meats, it should be recognized that there are four aspects of the problem.

1. Effect of cold on micro-organisms.
2. Effect of cold on meat.
3. Effect of gases on micro-organisms.
4. Effect of gases on meat.

If gas storage is commercially successful as a method of prolonging the merchantable life of meat, it must not only be able to restrain the growth of spoilage organisms: it must not injure the quality of the meat.

A summary of the world's most important scientific researches which bear on the foregoing four aspects of gas storage covers the literature of many countries. A portion of the review appeared in Part I of this article. (See August, FOOD INDUSTRIES, page 390.)

Lea[18] has investigated "Chemical Changes in the Fat of ..... Chilled Beef." He states in the introduction to his article that there is a considerable volume of data in the literature relating to chemical changes in muscle during storage of beef, but the information concerning chemical changes in the fat is extremely scanty. For example, Hoagland, McBryde and Powick[19] in their report on "Changes in Fresh Beef during Cold Storage above Freezing," were mainly concerned with muscle, though they did give figures for the fat at the beginning and end of their experiments, without attempting to follow the progress of the changes. The only important chemical change observed was an increase in the free acidity of kidney and external fats, values of 10 to 11 per cent being found. The meat was stored at 32-36 deg. F. (0-2.2 deg. C.) for periods up to 177 days.

Molds, yeasts and bacteria appeared as visible colonies on exposed muscle and in localized areas on the fat, here usually following connective tissue at an early stage in the experiment. At the end, parts of the meat not protected were covered with mold, but this did not spread generally over the fat. A peculiar "tainted" odor, which was first observed after fourteen days' storage, was found to have its origin in exposed muscle; this was quite different from the "tallowy" odor and flavor caused by atmospheric oxidation. After gradually becoming more pronounced this "taint" later decreased in intensity, probably due to drying and subsequent reduction in the number of micro-organisms.

Free acidity was estimated by direct titration and by extraction, both methods giving results in close agreement. Up to 25 days' storage the maximum value for back and breast fat was about 1.5 per cent (as free oleic acid) but, after this, there was a rapid increase, to 5 to 11 per cent at 42 days, the actual value depending on the part of the carcass from which the fat was taken. Even at this stage, however, the kidney fat still contained less than 1 per cent of free acid. (See Fig. 1).

It is of interest to note that Lea found oxidation at 0 deg. C. and even at 25 deg. C. to be very slow in the absence of light, and conditions varying directly with the quantity of light.

The flavor of the fat was still good after 25 days' storage, and after hanging for a further four days at 10 deg. C. Even after 42 days parts of the fat remained sweet, but there was a definite taint in places. After hanging for a further four days at 10 deg. C. the fat was badly tainted all over; the flavor of the muscle when cooked was, however, satisfactory.

GROWTH of micro-organisms was greatly retarded in a second experiment in which the air in the chamber was agitated by fans. This confirmed the expectation that the resultant drying of the superficial tissues of the meat and the considerable reduction in the humidity of the air zone immediately surrounding the carcass would have this effect. Free acidity was also much reduced in this second experiment, after 43 days being no more than 0.35 per cent

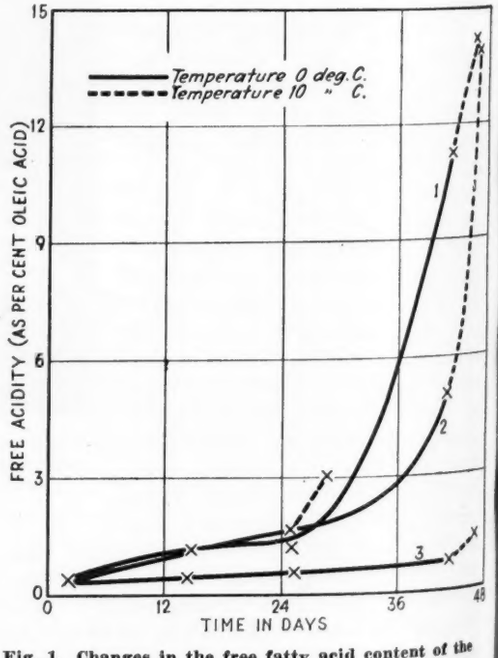


Fig. 1. Changes in the free fatty acid content of the fat of chilled beef. 1. Back fat; 2. Breast fat; 3. Kidney fat. From the Journal of the Society of Chemical Industry, Vol. 50, 217 T, (1931)

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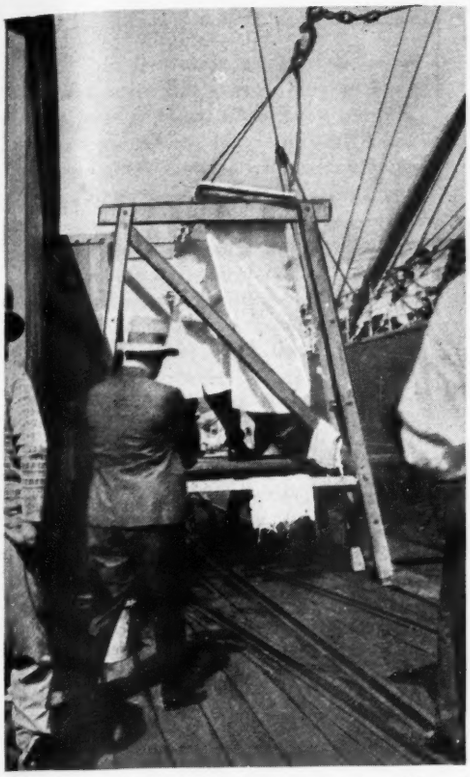

Fig. 2. This photo, supplied by Commonwealth and Dominion Lines, illustrates the care used at Townsville, Australia, to avoid all possible contamination of quarters of beef when transferring from rail to ship.

(as oleic acid) for back fat and still only 0.54 per cent after 60 days; breast fat showed a somewhat higher value, namely, 3.68 per cent after 43 days. Each of these three samples was sweet in flavor, which was in all cases checked against controls. By this means it was insured that taints would be rapidly detected which might be overlooked in cooked fat served up in the ordinary way.

THE scope of this second experiment was enlarged by storing a carcass of lamb and a side of pork under the same conditions as the beef. There was very little growth of molds or yeasts on either of these after 60 days in store. The fat of both was sweet, except that towards the end of the period the fat on the cut ends of the pork was found to be developing a greenish-yellow color. Experiments showed this fat to be highly oxidised, and it had the characteristic odor and bitter flavor of rancid pork fat. Lea makes an interesting suggestion that this peculiarity was due to diffusion of some substance, possibly an enzyme, from the cut muscle which catalysied the reaction. In lamb stored for 60 days, the breast fat and a small area on the back and near the tail had developed a sour flavor. Joints prepared from this pork and lamb, avoiding the areas mentioned, were found to be very good after cooking.

Lea concludes from these experiments that fat will never be rendered unpalatable by atmospheric oxidation, *provided it is not exposed to sunlight or direct skylight.* The front edge of the breast is most susceptible to taint. Drainage of blood at this point during and after dressing would favor the growth of micro-organisms. An important consequence of this is that the fore-quarter is much more difficult to chill successfully than the hind quarter.

Taint is always accompanied by high acidity, and there is probably a relationship between free acidity and attack by micro-organisms. The fact that micro-organisms do produce taint is shown conclusively by comparing the first and second experiments, for in the latter, where growth of micro-organisms was depressed by drying, there was no taint except in the breast fat. Storage under practical conditions necessitates that a balance be struck between excessive loss of weight of the carcass and deterioration of the fat.

Reference should be made to several papers published on the growth of molds and bacteria on frozen meat: Kaess[15] gives experimental data on the molds, *Mucor, Penicillium* and *Cladosporium,* at temperatures of 0 deg. C., 3 deg. C: and 6 deg. C. and relative humidities from 75 to 100 per cent. Bearing on the same matter, in an article by Marginescu[16] entitled "Do Unfrozen* Meats Deteriorate More Rapidly Than Fresh Meats?", it is stated that meats which have been kept in a frozen condition for three months, and thawed slowly and carefully, decomposed less rapidly than fresh meats. If they had been frozen for more than six months, they decomposed more rapidly than fresh meats, and, irrespective of the time stored in a frozen condition, rapidly thawed meats always decomposed more rapidly than fresh meats.

The bacterial content of frosted Hamburg steak was investigated by Geer, Murray and Smith.[17] They found that freezing destroys 80 per cent of the organisms. Thirty days storage gives an additional destruction of 35 per cent of the remaining organisms.

The Effect of Cold on Meat

The most recent work bearing on the effects of cold on meat itself is described in an article entitled *"Post-Mortem* and Refrigeration Changes in Meat" by T. Moran.[20] He emphasises the fact that it was only about the end of 1934 that emphasis was first put on the condition of slaughter and handling as the most important factors in the preparation of meat. The late Director of the Low Temperature Research Station at Cambridge on one occasion told a deputation that *a slaughter house should approximate in cleanliness to the operating theater in a hospital.*

It is now known that *rigor mortis* is not simply a process of protein denaturation and, in fact, at low temperatures the amount of denaturation which occurrs within 48 hours of death is very small indeed. However, this is dependent on cooling. If the meat is not cooled rapidly after death, the amount of denaturation may be very considerable. A figure of 40 per cent has been given for the rabbit in 24 hours at 30 deg. C. This shows very clearly the benefit to be derived from rapid cooling of meat after slaughter, since denatured proteins are more rapidly broken down by bacterial attack. Denaturation is important also from another point of view, as it determines the texture of the product and even has an indirect effect on flavor. Freezing encourages denaturation of muscle protein, a temperature between —2 and —3 deg. C. giving the maximum figure.

Transformation of haemoglobin into methaemoglobin is, of course, dependent on oxygen, and the change takes place most rapidly when the partial pressure of oxygen is low (approximately 4mm. at 0 deg. C. or 20 mm. at 30 deg. C.). This explains why a sample of stored unfrozen meat shows a zone of methaemoglo-

(*Turn to page* 488)

*Defrosted—Ed.

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Atmospheres

Stored Cold Ends Plant Cooling Troubles

By L. GORDON HOOPER

Plant Superintendent,
Miss Saylor's Chocolates, Inc.
Alameda, Calif.

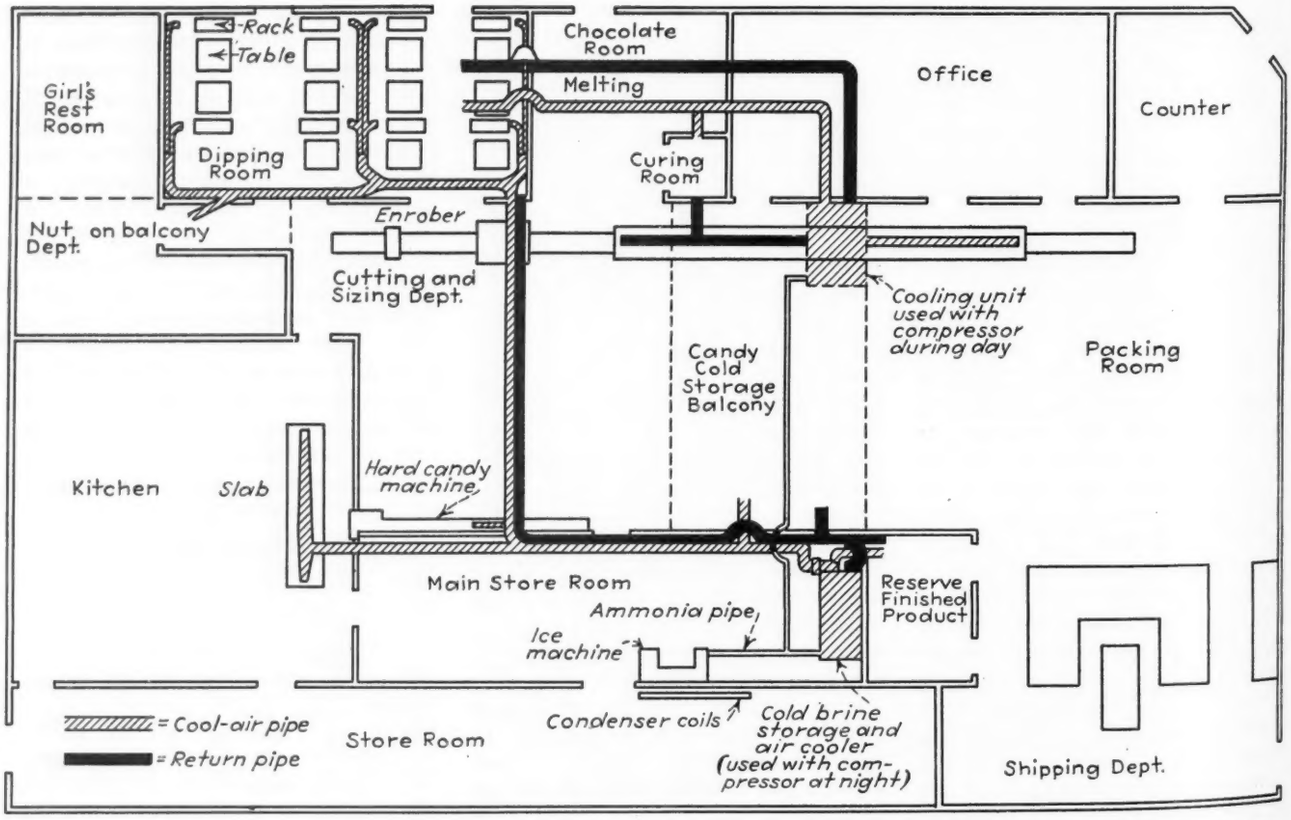
MAKING the best use of a small refrigerating system frequently becomes a puzzling problem to operators of plants manufacturing foods on a moderate scale.

This problem is most likely to arise in a business making a varied line of products requiring refrigeration. It is also likely to arise in a growing business in which production activities outrun the ability or opportunity of the company to enlarge its refrigeration system or to install a new system designed to handle the increased demand for plant air conditioning.

An example of what can be done to provide a maximum of cooling from a small refrigerating system is found in the factory of Miss Saylor's Chocolates, Inc. In this plant are employed approximately 100 people for making and packing box chocolates, candy bars, hard candies and nut confections.

Both temperature and humidity control are important in production of these goods. "Bloom" or graying of the chocolate will result if the centers are too warm or too cold; if the chocolate is too warm or too cool; if there is too much moisture in the dipping room; if the chocolate-coated goods are packed before they are thoroughly dry; if the temperature or humidity in storage or on the distributors' or reailers' shelves is too high.

Climatic conditions in the San Francisco Bay area are such that special provisions for humidity control of the air are not necessary. In cooling the air from the average outside temperature down to that required for the various processes, the



By operating on a brine storage system at night and on a direct expansion cooling system during the day an ammonia compressor of 3-ton ice capacity met the refrigerator requirements of Miss Saylor's Chocolates, Inc., plant at Alameda, Calif. The above diagram shows the duct arrangement which made this performance possible.

Controlled

▶*Even food manufacturing companies are not always able to have what they want, when they want it, or even where they want it. They sometimes have to use ingenuity in making the best use of what they have. This is particularly true with small or growing companies in regard to refrigeration.*

Companies making a varied line of goods in the following industries may get a helpful suggestion from this article.

Baking
Chocolate and Cocoa
Confectionary
Ice Cream
Meat Packing

humidity is reduced to a point which will not endanger the quality of the product.

The principal problem is the cooling of the chocolate dipping room, the enrober room and the storage room. In the dipping room 30 girls dip centers by hand at a temperature of 75 to 80 deg. F. in chocolate at a temperature of between 84 and 88 deg. F. It is necessary to provide a healthful circulation of fresh air in this room at a temperature which should be between 65 and 70 deg. F. with a relative humidity of about 40 per cent. The enrober room should be maintained at 80 deg. F. with centers at 75 to 80 deg. F. as for hand dipping. In this case the chocolate is maintained at a temperature from 87 to 92 deg. F. After passing through the enrober, the candy travels through a cooling tunnel for fifteen minutes, during which time it must be kept at a constant temperature of 58 deg. F. Requirements for the candy storage room include a normal temperature of between 68 and 70 deg. F. The investment in 20,000 lb. of candy in process and 25,000 lb. of finished product depends upon the maintenance of proper atmospheric conditions in the storage room as well as the production areas. In addition to these cooling jobs there are many little jobs such as the cooling of hard candy conveyors, the cooling of low-melting point pieces, and the maintenance of proper temperatures in the curing room for centers.

The unit by which the desired plant conditions are satisfactorily maintained is a 3-ton ice machine. Obviously it is a far smaller unit than would be considered for a new installation but it is what we have available for the job. Small as it is, the machine provides all the cooling necessary because it is run on an ingenious scheme of operation. Located in the central part of the building, it operates on two separate refrigerating systems.

One system is the conventional brine spray, air-cooling system in which the ammonia coils are submerged in the brine storage tank. By running the ice machine all night, the brine is cooled to a temperature of 10 deg. F. This storage reservoir of chilled brine washes and cools the air that is pumped to the hand dipping room, conveyors, nut department, kitchen cooler and both storage rooms during the day.

Every morning the ice machine refrigerant is automatically transferred from the brine storage system to a second system, which is of the direct expansion type, and through finned radiating units mounted in the bunker room. The air forced through these units is used primarily for cooling the enrober tunnel and curing room. It also supplements the amount of air going into the hand dippers' department by means of a mercoid switch which starts up a blower when the bunker room gets below the desired temperature for the enrober tunnel. The blower forces the cooled air into the dipping room until the bunker room temperature returns to normal.

Operating on this schedule, the ice machine runs on an average of about sixteen hours a day every day of the year. Another advantage gained by using the chilled brine storage independently of the ice machine's operation during the day is that of an improved load factor on the machine.

In the accompanying diagram, the piping arrangement for the two systems is shown.

Process of Aging Wines

(*Continued from page 445*)

a very limited extent. Some sweet wines are improved by heating in the presence of air and oak extractives. However, because of the danger of forming excess acetaldehyde, and because of disturbing the delicate balance between constituents of wine, artificial aging is not recommended. All of the present quick aging processes are defective in that they merely increase the rate of the oxidative changes and do not materially increase the rate of the esterification processes which give the beverage its delicate bouquet and aroma. Too much stress has been placed on oxidation. It is quite likely that, as in the case of whisky, the hydrogenation of some of the green constituents may result in a more rapid maturation.

The application of biologically controlled aging through the use of selected strains of various micro-organisms is even more promising. The oxidizing enzymes secreted by *Mycoderma* catalyze the oxidation of the sherries of Jerez (Sherry) giving them the "rancio" flavor that is so prized. *Saccharomyces anomalus,* another yeast, has been introduced by Takahashi for the aging of Saké, and Laborde indicates that bacterial action plays an important part in the normal maturation of sound wines.

Even though the chemistry of the aging of wine has been widely studied from the time of Berthelot, Pasteur, etc., the nature and sequence of the processes involved is still imperfectly understood. The application of newer tools of analytical chemistry should result in a clearer understanding of the complex processes involved. The oxidation processes are being studied in the light of the recent developments in the fields of auto-oxidation. Already the recent application of oxidation-reduction potentials to a study of the stability of beers by Clerck have been quite fruitful. Similar studies on wine are in progress.

A Correction

In Defense of the Lowly Mold

A SERIOUS omission from the article by Morris A. Pozen entitled "In Defense of the Lowly Mold," occurred in August, 1936 FOOD INDUSTRIES.

Please mark the break in the first column on page 399 of your August issue so that the following omitted paragraph will be included.

"There is no evidence of food poisoning ever having been caused by molds. (Italics by author Pozen.) The report has some interest as showing the absurd claims sometimes made in alleged food poisoning cases without any scientific evidence in support."

With this convincing testimony by an internationally known authority, the defense rests.

Our apologies are tendered to Mr. Pozen for dropping out the most important paragraph. THE EDITORS.

Atmospheres

Recent Progress in "Rope" and Mold Control

By GEORGE W. KIRBY
L. ATKIN
and
CHARLES N. FREY

Director, Fleischmann Laboratories
New York, N. Y.

▶ ***Among those who will find helpful suggestions in this article are:***

Bakers
Brewers
Dairymen
Kraut makers
Meat packers
Pickle makers
Yeast growers

CONTROL of "rope" producing bacteria and molds is an ever present problem in the field of food manufacture. These organisms have been a source of expensive trouble in the processing and handling of bakery products, milk, beer, pickles, kraut, and pickled meats. In the bread baking industry alone 1 per cent of the total production, or 100,000,000 loaves per year,* is conservatively estimated to be made unsalable because of mold. At 10 cents per loaf this loss amounts to at least $10,000,000.

That loss is for bread alone and by mold alone. If to this figure is added the loss suffered through the spoilage of other bakery products, not to say anything about that of other processed foods, by both mold and "rope" bacteria, we would have to think in terms of governmental budget figures.

This situation continues to exist in spite of all the information that has been published about the control of these organisms.

In our discussion of this subject we shall limit ourselves to the brief summation of some experimental work which has been done during the past few years at the Fleischmann Laboratories in New York City. This work has shown: 1. "Rope" in bread may be controlled by the addition of certain specific acid-acting ingredients to the bread dough. 2. Mold development will not be favored by making the bread dough acid with vinegar. 3. Mold development is effectively prevented by the use of a vinegar spray or wash on the crust of the finished loaf. 4. Mold development in many packaged foods, including bakery products, may be prevented through fumigation with ethylene oxide generally used to destroy insect infestation. Unwrapped products also may be sterilized by this fumigation but they will not stay sterile as long as will the packaged products.

The principal difference between the "rope" and mold problems lies in that the micro-organisms responsible for this spoilage vary considerably in their resistance to high temperatures. The spores of the *Mesentericus* group of bacteria which cause "ropiness" in baked goods are capable of surviving baking temperatures. Once these spores get into the dough, either by dough ingredients or by contact of the dough with a source of infection, a large number of them will survive the baking process and will cause "ropiness" in the baked product if the moisture, temperature, and acid conditions are favorable for their development. On the other hand, mold spores are killed by baking temperatures. Rarely, if ever, do mold spores survive the baking process. It is generally accepted that bread, for example, is, for all practical purposes, sterile with respect to molds when it leaves the oven.

This essential difference is extremely important in considering methods for controlling the development of these organisms. With respect to mold, there is the possibility that baked products may be kept sterile if they are cooled and wrapped in the absence of mold spores. An approach has been made to this end by the practices of scrupulous cleanliness and by cooling bakery products with air that has been washed and conditioned. Sterile handling and packaging in sterile containers or wrappers will result in a product that will not mold. However, such would be the ideal result. Also it is the goal that should be approached as closely as possible. But there are difficulties in reaching this goal. Nevertheless we have made studies and have obtained results, which we believe definitely indicate that the solution of the problem of mold on baked goods lies well within the boundaries of practical accomplishment.

As previously indicated the control of "rope" is a different problem. In this case the point of infection is on the dough side of the oven, and the "rope" spores survive the baking temperatures. In spite of these handicaps, methods for the control of "rope" in bread have been well worked out and reduced to practice.

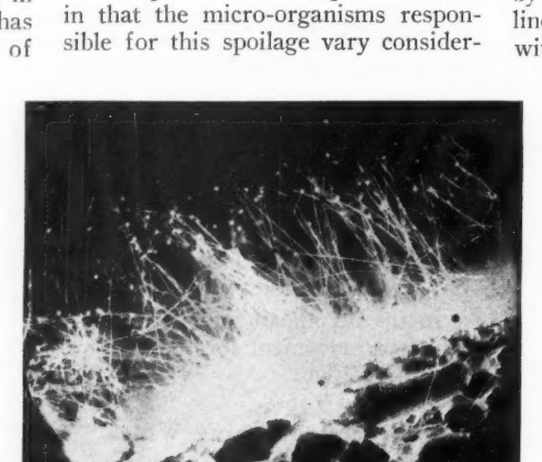


Fig. 1—Mold growth on bread starts on the surface yet it reaches deep into the crumb.

**Bakers' Weekly June 9, 1934, p. 42.*

Fig. 2—This loaf of bread was heavily inoculated with spores of *Aspergillus niger*. The left end was sprayed with vinegar, 9 per cent acidity, and did not develop mold growth as did the other end which was not given the vinegar treatment.

degree of "ropiness" was determined by inspection in some instances and in terms of catalase units, by a modification of the Bunzell method, in others. The absolute amount of any of these substances required to prevent the development of rope in bread vary somewhat with the bread formula, but the relative amounts remain essentially the same. A rich bread formula, for example, will require more preventive than a lean formula; other things being equal. It is of interest to note that vinegar and calcium acid phosphate prevent the development of "rope" at a pH of about 5.0 to 5.15; whereas tartaric acid, for example, must be used in sufficient quantity to give a higher acidity; a pH of about 4.7. This indicates that vinegar and calcium phosphate possess some specific anti-"rope" action other than that due to mere acidity.

Relative Effectiveness of Agents in Rope Prevention

Test Dough	Preventive Agent	pH Before Incubation	pH After Incubation	Catalase Units per gm. of Crumb	Degree of Ropiness by Inspection
1.	Control (no preventive)	5.44	5.90	17,250	++++
2.	0.30% Potassium bi-tartrate	4.92	5.24	undetmd.	+++
3.	0.50% Potassium bi-tartrate	4.65	4.70	undetmd.	—
4.	0.10% Tartaric acid	4.95	5.23	undetmd.	+++
5.	0.15% Tartaric acid	4.85	....	undetmd.	++
6.	0.20% Tartaric acid	4.63	....	undetmd.	—
7.	0.40% Vinegar (100 grain)	5.24	5.80	4,000	+++
8.	0.50% Vinegar (100 grain)	5.19	5.70	1,000	++
9.	0.60% Vinegar (100 grain)	5.15	5.17	0	—
10.	0.30% Calcium acid phosphate (Mono) — Mercks c. p.	5.20	5.60	1,650	+++
11.	0.40% Calcium acid phosphate (Mono) — Merck's c. p.	5.13	5.30	250	+
12.	0.50% Calcium acid phosphate (Mono) — Merck's c. p.	5.02	5.00	0	—
13.	0.35% Dough Improver "A"	5.20	5.70	6,800	+++
14.	0.35% "A" + 0.30% Vinegar (100 grain)	5.10	5.25	80	+
15.	0.35% "A" + 0.40% Vinegar (100 grain)	5.07	5.07	0	—
16.	0.50% Dough Improver "B"	5.20	5.65	1,800	+++
17.	0.50% "B" + 0.2% Vinegar	5.13	5.25	0	—

These methods are: 1. Careful control over the "rope" spore content of ingredients. 2. Scrupulous cleanliness. 3. Use of harmless acids or acid salts in the dough. The acids and acid salts commonly used for this purpose are vinegar, calcium acid phosphate, lactic acid, and tartaric acid. In the table is given data obtained from recent studies made by us to determine the relative effectiveness of these "rope"-controlling agents.

In carrying out these studies, we made a series of bread doughs which were equally and uniformly inoculated with a definite quantity of "rope"-producing bacterial spores. Baking conditions were the same for all doughs. The percentages in table represent the amount of each agent found necessary to prevent completely the development of "rope" in the loaves during an incubation period of 65 hours at 30 deg. C. These percentages are calculated on the weight of flour in the dough. The

Acidifying doughs to prevent "ropiness" in bread has been the practice for a number of years. Recently, however, bakers have been warned against this practice by the claim that acidity favors mold development. We now know this claim to be erroneous and unsubstantiated. Our studies have clearly shown that, within the limits of breadmaking, mere acidity is without direct influence on the growth of bread molds. Furthermore, we and others have found that acetic acid, the acid of vinegar, has a specific toxic action on molds. However, it is unfortunate that this specific action on molds depends on the reaction of the bread or any other substance to which vinegar is added. The lower the pH of—the more acid—the product, the more effective is a given quantity of acetic acid. This variation results because the undissociated acid molecule (CH_3COOH), which is the toxic agent, tends to disappear from a solution of the acid when it is neutralized. This disappearance may be illustrated by the equations:

$$\underset{\text{Acetic acid}}{CH_3COOH} + \underset{\text{Sodium Hydroxide}}{NaOH} \rightleftarrows \underset{\text{Sodium acetate}}{CH_3COONa}$$

(Undissociated)

$$+ H_2O \rightleftarrows \underset{\text{Acetate ion}}{CH_3COO^-} + \underset{\text{Sodium ion}}{Na^+}$$

Water

The acetate ion, CH_3COO^-, produced by neutralization and subsequent ionization, is, according to our experiments, without significant effect upon molds in ordinary concentrations. The double arrows indicate that the reaction does not proceed completely in one direction. The equations represent an equilibrium and indicate that all of the various chemical forms may exist side by side in a certain ratio to one another, depending on the pH (the acidity) of the solution. For example, if NaOH is added to an acetic acid solution until the pH is 4.73, only 50 per cent of the initial concentration of CH_3COOH exists in the molecular or undissociated form. This percentage decreases sharply as the pH is raised—the solution made less acid—and at pH 5.4 the concentration of CH_3COOH is only about 17 per cent, and at pH 6.0 it is only about 5 per cent.

While the acetic acid molecule is toxic to molds the neutralized acid (sodium acetate for example) or the acetate ion are not very toxic. For

(Turn to page 470)

Fig. 3—Both loaves were inoculated with spores of mold commonly found on bread. The one on the right was given an ethylene oxide treatment in a vacuum chamber. Mold did not develop. Other loaf was given the vacuum chamber treatment without ethylene oxide. It has heavy mold growth.

New Methods Speed Production

Ice cream plant mechanizes manufacture of two specialty products

By HAROLD E. MILLER

Production Superintendent,
Fifth-Ave. Package Plant,
The Borden Co., New York.

IMPROVED METHODS of manufacture have greatly increased production of two products at the Fifth-Ave., New York, plant of Borden's Pioneer Ice Cream division. This plant has taken a tip from the metal-working trade and is "die-casting" fancy-form novelties instead of molding them by hand. And it has installed a high-speed production and packaging line for ice cream sandwiches. Both of these innovations were conceived and designed by the plant's own engineers.

The fancy-form machine makes 75 dozen novelty pieces an hour, or about twice as many as had been turned out previously with the same number of workers. The machine operates three dies at one time, permitting three different forms to be made. This makes possible variety packages containing, for example, fancy forms in the shape of roses, carnations and dahlias. Moreover, the dies may be changed within a few minutes to permit the manufacture of any desired form. Dies are made in the plant at little expense, being cast in soft metal from a plaster form which is shaped in the molds formerly used to make fancy forms by hand.

No waste is produced in this molding machine, because the quantity of ice cream fed into the die is such as to fill it evenly, with no excess to be squeezed out as the two sections of the die come together.

THERE is nothing complicated about the machine. It consists simply of a fixed frame holding the lower halves of the dies and a reciprocating head carrying the upper die sections. The latter moves up and down on four guide rods which assure accurate alignment. An electric motor drives the moving head at a speed of 28 cycles a minute, although this speed can be varied.

To prevent the ice cream from sticking when the form is pressed into shape, it is necessary that the dies be heated. This is accomplished by using hollow dies and circulating water at 110 deg. F. through them. This requires as auxiliary equipment a water pump and a tank for holding the circulating water. Connections from the water line to the dies are made through flexible rubber hose so that the upper halves of the dies are free to move. The hose also permits connections to be made and broken easily and quickly when the dies are changed.

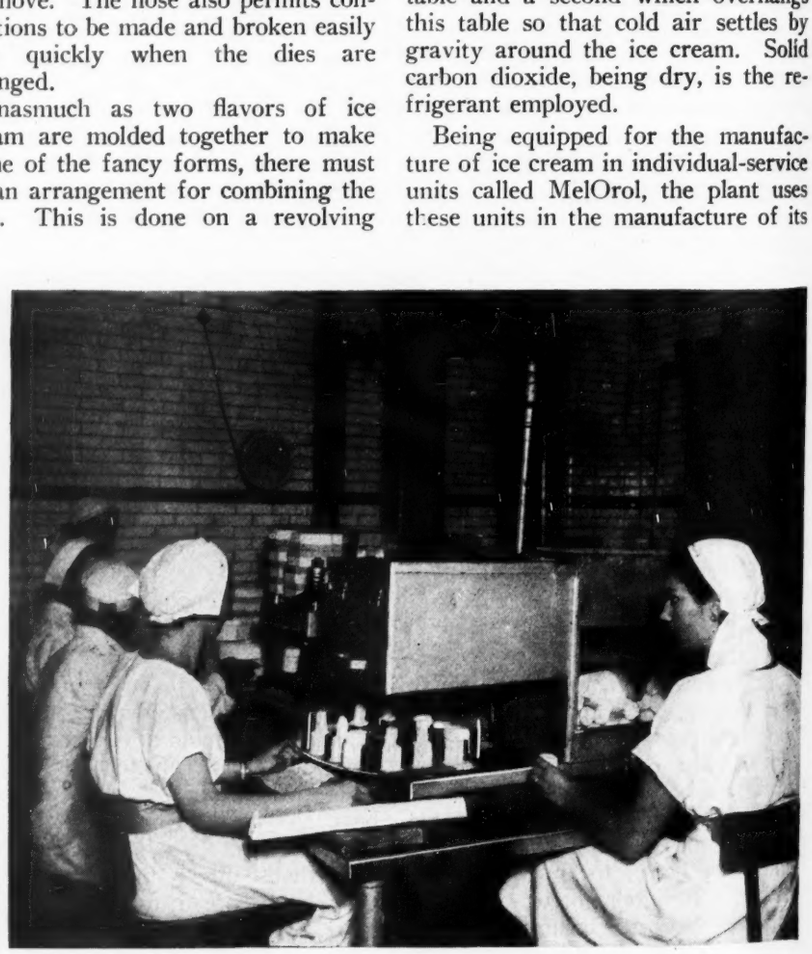
▶*Production methods described in this article are of interest to:*

Ice Cream Manufacturers
Confectioners
Bakers

Inasmuch as two flavors of ice cream are molded together to make some of the fancy forms, there must be an arrangement for combining the two. This is done on a revolving metal table on which are placed twelve of the pieces to be fed into the machine. About a foot wide, this table has on each side three upright, semi-cylindrical forms whose curved shapes receive the units of ice cream. An operator at this table places small pieces of a second flavor on top of the larger units held in the semi-cylindrical forms, and the two flavors are fed together into the molding machine.

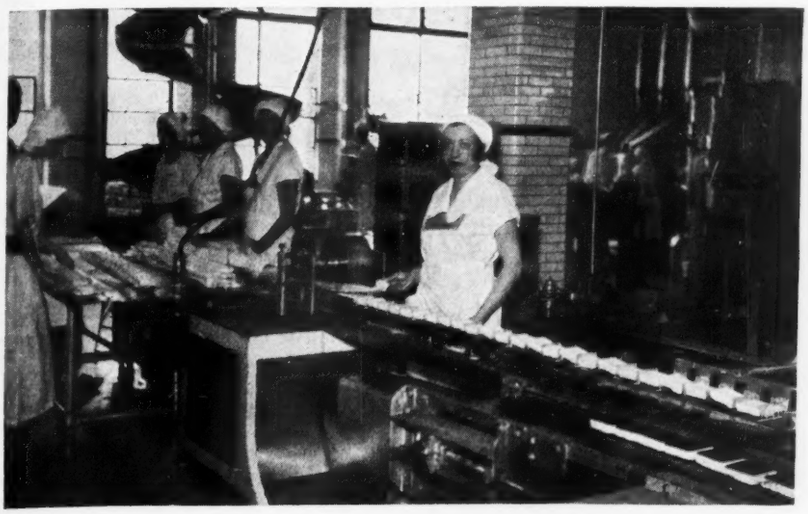
So that the ice cream will not become soft before it is pressed into fancy shapes, a special refrigerating cabinet is provided. It has one compartment where the ice cream is kept before being put onto the revolving table and a second which overhangs this table so that cold air settles by gravity around the ice cream. Solid carbon dioxide, being dry, is the refrigerant employed.

Being equipped for the manufacture of ice cream in individual-service units called MelOrol, the plant uses these units in the manufacture of its



Equipment for die-casting fancy forms of ice cream. Molding machine is in background. Refrigerated cabinet and table where flavors are combined are in foreground.

fancy forms. And having also a machine which produces ice cream in ribbon form, it cuts the ribbons into small pieces to be put on top of the individual-service units as the second flavor. Ice cream in these special forms, however, is not necessary to the operation of the machine.



Line-up where 500 dozen ice cream sandwiches are made per hour. Completed sandwiches, shown in foreground, pass on to pneumatic bag opening machines for packaging.

Four girls and one man operate this fancy form equipment. Briefly, here is what they do: The first girl unwraps the units of MelOrol and places them on the revolving table. The second girl cuts off small pieces of the second flavor and places those on top of the other ice cream. The man feeds the die casting machine, using an ice pick to pick up the pieces of ice cream and insert them into the dies. The third girl packages the molded forms, while the fourth helps with packaging, takes filled boxes to the hardening room and brings stock to the machine.

To obtain maximum production, the man operating the machine must have a piece of ice cream in the dies every time the head of the machine comes down. He does that without difficulty, using his left hand to pass a pressed form to the girl who does the packaging while picking up a piece of ice cream and inserting it into the die with his right hand.

THE Pioneer ice cream plant's mechanized operation for making ice cream sandwiches attains real mass production—500 dozen an hour—which is several times what the same number of workers could manufacture by methods formerly used.

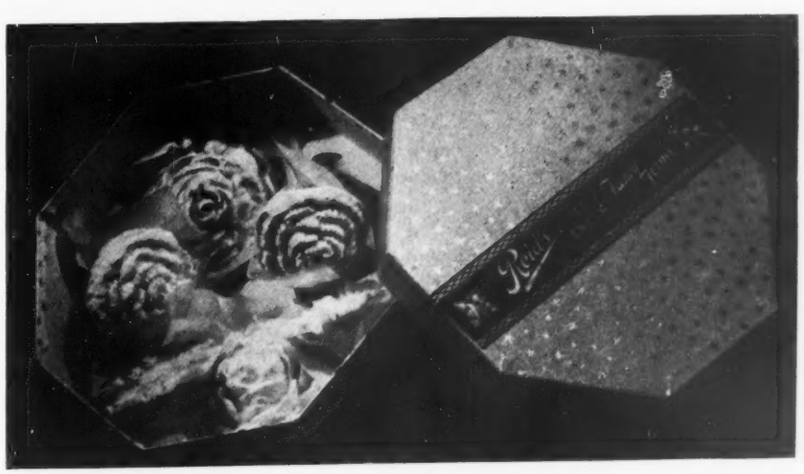
In this operation, too, the plant takes advantage of the fact that it has a machine for producing ice cream in ribbon form. Essentially, the ice cream sandwich machine is a mechanism for cutting these ribbons into short lengths and placing the pieces between cookies. The dividing mechanism is nothing more than a stainless steel belt, little wider than the ice cream ribbon, to which are fastened vertical fins, or dividers, at intervals equal to the length of the sandwich. The process of making the sandwiches, then, is simply this: Deposit cookies in the spaces between the dividers. Then, lay a ribbon of ice cream over the belt and pass it under rollers to depress it between the dividers, and cut it into short lengths. Lastly, deposit cookies on top of the ice cream.

Following the operation step by step: Two girls drop cookies between the dividers as the stainless-steel belt comes up over the pulley at the beginning of the line. Then two other girls partially unwrap the lengths of ribbon, leaving the paper on one side only, and place the ribbon on the belt with the unwrapped side down. As the belt passes under two heavy metal rollers, the ice cream is forced between the dividers and on top of the cookies previously deposited there. Immediately beyond the rollers, a girl removes the paper from the top side of the ice cream as the conveyor moves on to the end of the line. At the end of the conveyor, the belt passes between two belt conveyors which supply the packaging lines. At that point, a girl with a five-section rake slides five of the sandwiches to one belt and then five to the other, alternately. Then one girl on each belt deposits cookies on top of the ice cream to complete the sandwiches.

THE completed product travels along the two conveyor belts to pneumatic bag opening machines where two girls on each belt pick up the sandwiches and drop them into bags. The filled bags fall to the conveyor and pass to a girl who places them in cartons. One girl sets up these cartons for both packaging lines, and one man seals them before they go to the hardening room.

The bag opening machines are important in this line-up, because they speed packaging tremendously.

Two cookie dispensers, each doing the work of two girls have been used to some extent in making the ice cream sandwiches, but these have given considerable trouble. If they can be made to operate satisfactorily, however, they are a desirable addition to the equipment.



Package of fancy-form ice cream. Two each of three forms—rose, carnation and dahlia—are included in package.

Services Food Advertisers Want

By THOMAS G. MacGOWAN
President, Facts, Inc., New York, N. Y.

FOOD ADVERTISERS are, in general, considerably better satisfied with the completeness of their advertising agencies' service than are American advertisers as a whole. This is apparent from the findings in our national survey on advertisers' relationships with advertising agencies, the first study which has attempted to shed light on the comprehensiveness of agency service to food and other advertisers.

Not only do food advertisers more frequently want the various agency services than do advertisers in other lines, but when one of them wants a certain type of agency service he is much more likely to receive it.

In our interviews with 225 advertisers, of whom 44 were in the food field, we found an average demand of 61.0 per cent for the various services by food advertisers, with 49.1 per cent of their demand being met as a whole. However, the average percentage of demand for the services is 57.6, while these advertisers say that only 39.9 per cent of their service requirements are supplied.

This means, of course, that a great many advertisers in general are, by their own statements, unable to obtain agency services they want, and that a fair number of food advertisers, in particular, also say they encounter this difficulty.

The survey findings show that larger advertisers are considerably the most prone to seek a wide range of agency services, and that the medium-sized and small ones follow on about even terms in their desire for a comprehensive agency service program.

On the other hand, the percentage of unfilled agency service wants is, as might be expected, greatest in the case of the small food advertisers. They say that 31.6 per cent of their agency service requirements, as an average, are not cared for. It is least marked among the large ones, who report that only 9.5 per cent of their service wants are not taken care of by their agencies. Among advertisers as a whole, the rule is likewise that the larger advertisers make the fewest agency service complaints.

The survey shows, therefore, that the larger the advertiser the more likely he is to expect a lot, and the smaller he is the more likely he is to be disappointed.

The average percentage of unfilled agency requirements is largest in the field of non-advertising or special functions, where it is 29.1 among the food advertisers and 41.3 among advertisers generally. In the purely advertising phases of the business, the percentage of unfilled demand is 12.5 among food advertisers and 22.5 among advertisers as a whole.

We find that an average of nearly half of the food advertisers—49.1 per cent—are interested in receiving from agencies various services which are outside the range of advertising, but that only 35.2 per cent of them, by and large, receive these services from their agencies. Among all advertisers the percentages are, respectively, 44.9 and 26.5.

Advertisers were presented with a check-list of twenty agency functions, upon the services advertisers want, those they receive and those for which they are willing to pay extra.

The key questions were:

"What services do you think an advertising agency should give to an account spending as much as you do?"

"Which do you now receive?"

"Should some of these services be charged for apart from the commission arrangement?"

The average percentage of all food advertisers who, desiring various advertising services, are willing to pay extra for them, is 4.5, as compared with 5.3 for all advertisers. In the case of the non-advertising services, the percentage among food advertisers was 8.5, whereas among all advertisers it stands at 7.6 per cent. The grand averages percentages are 6.9 and 6.7 respectively for food advertisers and all advertisers interviewed.

Performing of special surveys was the service for which advertisers of all kinds were most often willing to pay extra; next came direct mail, and then conducting basic market research.

Of the twenty services considered, eight involve advertising *per se* (the various activities in handling publica-

ADVERTISERS' DEMAND FOR VARIOUS SERVICES VERSUS THE EXTENT TO WHICH THEY RECEIVE THEM

	Food Advertisers			All Advertisers		
SERVICES	Want the Service (Per cent)	Get the Service* (Per cent)	Will Pay Extra (Per cent)	Want the Service (Per cent)	Get the Service* (Per cent)	Will Pay Extra (Per cent)
Prepare copy	100.0	95.1	2.3	95.1	89.1	1.3
Place and check publication advertising	100.0	92.7	....	93.8	87.2	0.9
Originate publication-copy ideas	90.9	92.7	....	91.1	84.4	2.7
Evaluate media and prepare schedule	90.9	92.7	....	89.3	83.4	4.0
Develop radio programs and prepare continuities	79.5	58.5	4.5	72.9	41.7	7.1
Check advertising effectiveness	77.3	56.1	2.3	72.4	46.9	1.8
Pre-test themes and copy	77.3	46.3	4.5	71.1	40.8	4.4
Supervise and check radio programs	72.7	56.1	2.3	68.4	38.9	3.6
Prepare and handle outdoor advertising	59.1	41.5	9.1	63.6	34.1	4.9
Carry on publicity	63.6	41.5	6.8	61.8	38.9	6.2
Conduct basic market research	61.4	43.9	15.9	59.6	32.2	14.7
Provide sales counsel	59.1	46.3	....	54.2	37.9	4.4
Perform special surveys	54.5	41.5	34.1	52.4	32.7	24.9
Carry on package development	40.9	29.3	13.6	41.8	20.4	12.4
Prepare and handle direct mail	38.6	31.7	18.2	38.7	20.4	18.2
Perform merchandising service	50.0	34.1	11.4	37.3	22.7	7.6
Assist in product development	38.6	26.8	6.8	33.3	17.1	5.3
Delineate trading areas	22.7	19.5	2.3	23.6	11.8	3.6
Study distribution costs and profits	27.3	24.4	2.3	16.9	10.0	3.6
Set sales quotas	15.9	12.2	2.3	12.4	6.6	1.3
All advertising services	79.0	70.1	4.5	76.6	59.9	5.3
All non-advertising services	49.1	35.2	8.5	44.9	26.5	7.6
All services	61.0	49.1	6.9	57.6	39.9	6.7

* These percentages are based only on those advertisers who have agencies.

...and Get from Agencies

tion copy, radio, outdoor, direct mail and media selection), and twelve deal with non-advertising matters (sales counsel, research, sales analysis, package and product development, merchandising and publicity and their branches).

Now for a look at the picture in detail—at the various services which food advertisers want and which agencies with fair frequency, apparently, fail to supply. The tables which accompany this article list them fully.

When we classify and regroup the services under more specific headings, many interesting facts appear. Publication copy services are seen to head the list of advertising services most in demand:

	Percentage of demand
Publication copy services (ideas, copy, placement and checking)	97.0
Media evaluation and scheduling	90.9
Radio (programs and continuities, placement and checking)	76.1
Outdoor preparation and handling	59.1
Direct mail preparation and handling	38.6
All advertising services	79.0

The percentages summarizing cases in which the advertiser, wanting an advertising service, does not get it, show "outdoor" in the lead:

	Percentage of non-supply
Outdoor	29.2
Radio	26.5
Direct Mail	18.8
Publication copy	4.0
Media	2.6
All advertising services	12.5

Advertisers as a whole sought publication copy services somewhat more frequently than did food advertisers, and demanded radio services much more often. On the other hand, they were less prone to demand service on outdoor advertising. The order of unfilled advertising service wants of all advertisers was: outdoor, direct mail, radio, media and publication copy.

Among the functions which may be classed as "non-advertising services" we find "research" the leader in demand:

	Percentage of demand
Research (basic market study, special surveys, pretesting, checking of effectiveness)	70.1
Publicity	63.1
Sales counsel	59.1
Merchandising	50.0
Package and product development	39.7
Sales analysis (sales quotas, trading areas, distribution costs and profit)	22.0
All non-advertising services	49.1

Now, in the scale of non-advertising services desired but not received, we find publicity at the top:

	Percentage of non-supply
Publicity	34.6
Package and product development	32.3
Merchandising	30.0
Research	29.6
Sales counsel	24.0
Sales analysis	21.7
All non-advertising services	29.1

These percentages are generally comparable with those for all advertisers.

One of the most surprising facts in the study is that "advertising effectiveness" and "pre-testing themes and copy" were the two most-wanted services in the general list of twenty functions after copy services, media selections and radio-program development. The former, the technique of which is far from perfected, is wanted by 77.3 per cent of all food advertisers and the latter by the same percentage of them.

Following is a summary of advertisers' reactions in the matter of extra charges on advertising services:

	Percentage of favorable responses
Direct mail	18.2
Outdoor	9.1
Radio	3.4
Media	...
Publication copy	.8
All advertising services	4.5

With the non-advertising functions, the summary runs this way:

	Percentage of favorable responses
Research	14.4
Merchandising	11.4
Package and product development	10.0
Publicity	6.8
Sales counsel	...
Sales analysis	2.3
All non-advertising services	8.5

ADVERTISERS WHO DO NOT GET SERVICES THEY WANT

SERVICES	Food Advertisers: Large (Per cent)	Medium (Per cent)	Small (Per cent)	Total (Per cent)	All Advertisers: Large (Per cent)	Medium (Per cent)	Small (Per cent)	Total (Per cent)
Delineate trading areas	....	33.3	33.3	20.0	27.8	53.3	73.7	51.9
Carry on package development	11.1	25.0	75.0	29.4	44.4	48.1	65.4	51.7
Assist in product development	12.5	66.7	33.3	35.3	35.3	65.0	61.1	50.0
Set sales quotas	....	66.7	....	28.6	30.0	44.4	75.0	48.1
Conduct basic market research	10.0	33.3	50.0	28.0	43.1	41.5	58.3	46.9
Prepare and handle outdoor advertising	9.1	16.7	71.4	29.2	36.0	39.5	63.8	46.7
Prepare and handle direct mail	12.5	....	66.7	18.8	37.5	50.0	52.2	45.2
Study distribution costs and profits	....	33.3	....	16.7	28.6	36.4	69.2	44.7
Supervise and check radio programs	8.3	45.5	25.0	25.8	30.9	47.8	56.8	44.2
Develop radio programs and prepare continuities	8.3	46.2	25.0	27.3	26.8	50.9	55.6	43.6
Pre-test themes and copy	23.1	50.0	50.0	38.7	35.1	44.2	52.4	43.0
Perform special surveys	9.1	33.3	50.0	26.1	26.1	37.8	61.3	39.5
Perform merchandising services	30.0	42.9	....	30.0	31.4	43.5	47.6	39.2
Carry on publicity	12.5	22.2	66.7	34.6	30.0	27.5	49.0	36.4
Check advertising effectiveness	20.0	35.7	14.3	25.8	22.0	40.4	30.4	35.3
Provide sales counsel	....	14.3	55.6	24.0	26.3	21.4	50.0	32.2
Originate publication-copy ideas	....	....	9.1	....	3.0	4.5	18.0	8.2
Evaluate media and prepare schedules	7.1	....	8.3	2.6	1.5	8.0	14.5	7.9
Place and check publication advertising	7.1	7.1	7.7	7.3	3.0	4.5	14.1	7.1
Prepare copy	....	....	15.4	4.9	1.5	1.4	21.5	6.5
All advertising services	6.1	12.4	21.3	12.5	14.8	20.8	32.8	22.5
All non-advertising services	13.1	37.2	44.8	29.1	32.5	40.3	53.6	41.3
All services	9.5	24.6	31.6	20.5	23.2	29.9	42.3	31.3

New PACKAGES *and* PRODUCTS

More Wine in Cans

AS WITH BREWERS, there is a difference of opinion among vintners as to which is the better tin can for wine, the type closed with a crown cap or the conventional shaped container. The first tinned wine placed on the market, introduced by Wine Packing Corp., Stockton, Calif., appeared in a crown-capped can (FOOD INDUSTRIES, July, 1936). But two other wineries have adopted the conventional tin. These are Vacuum Wine & Spirits Canning Corp., Elk Grove, Calif., and Bear Creek Winery, Lodi, Calif. Both of these firms vacuum-pack their tinned wines in containers with special linings.

Maple-Flavored Meat

WM. FOCKE Co., Dayton, Ohio, has created a new formula for curing hams which gives the meat a maple flavor. This new product, the result of several years of experimental work, is packaged in amber-colored cellulose.

Convenient Condiments

CONTAINERS for condiments need a shaker top for consumer convenience. But they ought to be covered with a solid closure. Both of these requirements are met in the package put on the market by A. Schilling & Co., San Francisco. This company's 3-oz. jars of onion, celery and garlic salt are fitted with a neat, rolled-on shaker cap of aluminum. And over this is placed a sift-proof screw cap.

Modernizes Six Jars

WHAT with the advent of a new management, Knight Packing Co., Portland, Ore., has adopted a more aggressive sales policy. And modernization of packages was considered an important element in plans for increased sales. So the entire line of Knight products was repackaged. Six items—ger-kin-ets, pickles, olives, mustard pickles, relish and mixed sweet pickles—now appear in attractive glass jars with neat labels and closures. All of the packages being of the same shape and bearing a standardized label, each is identified with the complete line. Much of the eye appeal of this container family is due to the sweeping lines of the tapering, paneled jars. The Knight company reports important increases in sales since introducing the new packages.

Striking Family

CONSUMERS seeing any one of the five new packages introduced by Peter Rossi & Sons will immediately identify it with the complete Rossi line. This Braidwood, Ill., firm has obtained a striking resemblance between its containers for macaroni, egg noodles and spaghetti, although they are of different shapes and construction. Three of these packages have transparent cellulose panels to display the contents, and two have closed fronts. But all have a common design of modernistic motif, and all display with prominence and dignity the brand name and the name of the product. Protection against breakage of the product and damaged returns comes through the use of sturdy paperboard folding cartons. Designed for sealing by automatic machinery, the containers minimize packaging operation costs. Recipes are given on side and back panels.

Better Bottle, More Sales

INCREASED SALES are traceable directly to the special container recently adopted for "Mexi-Pep." So reports B. F. Trappey's Sons, Inc., manufacturers of the "Good'n Hot" condiment. The package used by this New Iberia, La., firm, is a slender bottle with shoulders tapering gracefully to a long, narrow neck. A neat closure and a label of impressive design add the finishing touches. The small opening in the bottle makes the container a convenient dispenser.

Mustard Jar With Appeal

MUSTARD is much too ordinary to have any particular attention value of itself. So its manufacturers must utilize the container in which it is marketed to gain a sales advantage. A package which serves this purpose well is the new flower-vase jar introduced by Plochman & Harrison, Chicago. Not only does this container stand out by virtue of its pleasing lines, but it exerts strong appeal through its reuse value. It takes advantage of the new vogue for arranging flowers in vases which give artistic display to the stems as well as to the blossoms. The concentric horizontal circles which decorate the jar break up the lines of the flower stems into interesting shapes. No label is pasted on this package to impair its reuse value. Instead, the labeling elements are printed on the cap. Then a free label is suspended from the neck to achieve additional attention value and to emphasize the secondary use of the container.

Fig Bars in Foil

METAL FOIL has found favor among packers of a wide variety of products within recent months. One of its new applications is in a package of the fig bars of Zion Baking Industry, Zion, Ill. The container is covered with a wax-mounted, heat-sealing wrap of foil. Resistance against moisture and heat are two properties making the material desirable for this application. It also has strong eye appeal, being printed in bright colors against a silver background. Of modernistic design with the color in heavy rectangular blocks, this fig-bar package gives emphasis to the name of the product and of the company. And the design is not cluttered with superfluous elements.

Holiday Package

THOUGH nearly four months until Christmas, it's not too early to be thinking about special holiday packages. One of the illustrations in this department shows what has been developed by Esskay Products, Baltimore, Md., in the way of a super sales getter for the Yuletide. It consists of an assortment of five packages attractively arrayed in a special corrugated shipping box. The different items are packed in partitions covered with green glassine excelsior. Finished in a bright green color, the box is covered with dark green Christmas trees. This type of package is economical because it is used both for shipment and display.

Garlic Salt
Schilling
3 ounces
Onion Salt
Schilling
3 ounces
Celery Salt

KNIGHT'S

ROSSI
MACARONI
PRODUCTS
ROSSI
Pure
EGG NOODLES
ROSSI
MACARONI
ROSSI
MACARONI PRODUCTS
ROSSI
SPAGHETTI

Flower Vase
Flower Vase
Flower Vase

Zion
fresh
FIG BARS
MADE WITH MILK HONEY & EGGS
Zion FIG BARS

PROMOTING THE PRODUCT

▶National Livestock and Meat Board succeeded in making August a "beef month." Meat retailers, including Kroger Grocery & Baking Co. and other chains, cooperated in campaigning for beef sales. Promotional material included special ads, recipes for preparing beef, menus built around the meat and facts on its food value.

▶National Tea Co., Chicago, has adopted color photography on labels to obtain the exact reproduction of the contents of the can. The purpose is to tell the consumer more accurately what the can contains.

▶Maltex Co. has gone on the air over sixteen stations of Columbia Broadcasting System with a Monday, Wednesday and Friday evening program, "The Treasure Adventures of Donald Ayer." It is a children's broadcast.

▶Continental Can Co. has been cooperating with Midwestern breweries in advertising beer in tin cans. The breweries carried display advertisements bordering around the can copy in Chicago newspapers.

▶Ice Cream Merchandising Institute, Inc., Washington, has prepared display posters which can be purchased by members of the industry.

▶Vacuum Wine & Spirits Canning Corp., Elk Grove, Calif., has launched an extensive advertising campaign to popularize its canned wine.

▶Ralston Purina Co. will inaugurate a new radio program Sept. 28 over the National Broadcasting Co.'s red network. It will be heard from Mondays through Fridays at 5:15 to 5:30 p. m., E.S.T.

▶Jacob Ruppert Brewery is developing an outdoor painted display program of unusual proportions. The five boroughs of Greater New York will be "dominated" by these displays.

▶Continental Baking Corp., New York, went on the air Aug. 9 with a Sunday night program, "The Wonder Show," over WOR and WGN.

▶Cudahy Packing Co., Chicago, will begin broadcasting a dramatic program, "Bachelor's Children," Sept. 28 over WLW and WGN. It is a Monday to Friday forenoon program.

▶Institute of American Meat Packers, Chicago, has published a 72-page recipe booklet, "Good Things Made with Lard."

▶Borden Company's cheese division will dramatize the deliciousness and utility of its cocktail cheeses through ads in nineteen newspapers in eleven Eastern and Mid-western cities. A prize contest involving 50-word answers to "Why I Like Borden's Cocktail Cheese Best" will be advertised.

▶Sperry Flour Co. recently gave radio listeners a cook book, "71 Ways to Win Praise." Those who wanted the book sent in a card stating that they were, or would become, users of the company's pancake and waffle flour.

▶Horlick's Malted Milk Corp., Racine, Wis., recently offered on its radio program a malted-milk mixer which fits a glass, jug or other container.

▶Milk Industry Foundation had a booth at the recent national convention of American Home Economic Association in Seattle. Copies of "Milk for Millions" were distributed.

▶H. J. Heinz Co., Pittsburgh, inaugurates its new radio program, "Magazine of the Air," Sept. 2. It will be a 30-minute broadcast over a nationwide Columbia network on Monday, Wednesday and Friday nights. Heinz is offering consumers the price of a can of its soup and a can of any other brand if the consumer, after trying both, prefers the competing product.

▶Canning Peach Industry Board of California has named a committee of growers and packers to plan for a $200,000 advertising campaign to promote canned peaches during the fall and winter.

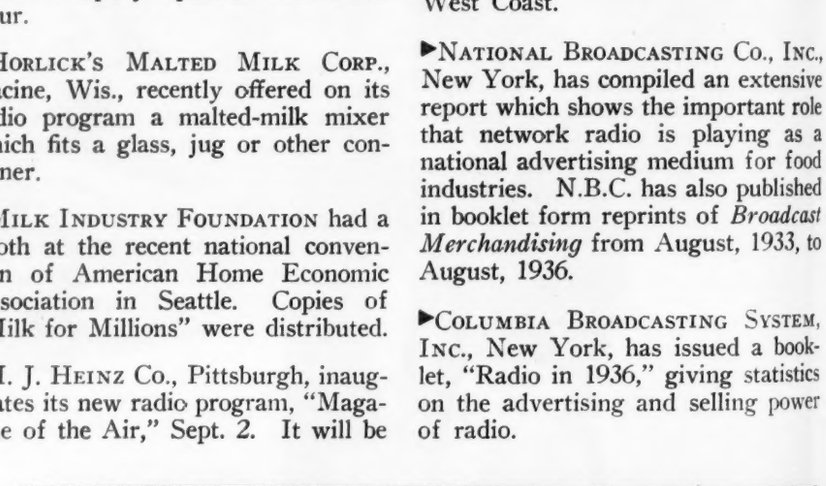
▶New York State's bureau of milk publicity is advertising milk as an alkalizer for tired or jittery business men. Newspaper space is used in this promotional work.

▶Lang Brewery, Inc., Buffalo, will erect ten "spectaculars" within the city.

▶Morton Salt Co. is launching an advertising and merchandising campaign to promote iodized salt on the West Coast.

▶National Broadcasting Co., Inc., New York, has compiled an extensive report which shows the important role that network radio is playing as a national advertising medium for food industries. N.B.C. has also published in booklet form reprints of *Broadcast Merchandising* from August, 1933, to August, 1936.

▶Columbia Broadcasting System, Inc., New York, has issued a booklet, "Radio in 1936," giving statistics on the advertising and selling power of radio.



UNDER THE BIG TENT

This is one of the outstanding features of the food section in Lakeside Exhibition Hall at the Great Lakes Exposition. It is the circus merry-go-round of Beech-Nut Packing Co., Canajoharie, N. Y. A parade of miniature circus wagons displays the company's products.

Magazine Feeds Solve Some Package Wrapping Problems

By FRANK H. MAYOH
Design Engineer, Springfield, Mass.

IN *Food Industries* for February, 1936 pp. 80-84, we discussed adjustments of belt feeds for wrapping machines. These adjustments make possible the handling of packages of different sizes and shapes. They work best when the packages move in a continuous manner from the filling unit to the sealing and wrapping machines.

Another type of feed highly important to the food manufacturer and packer is the magazine feed. This type of feed is frequently preferred when the packages are small and likely to cause jams at the wrapping machine if fed to it on a belt. It is important when the packages come from two or more filling and sealing machines to be wrapped on a single wrapping machine. In such a set-up the packages are generally delivered by conveyors to a common point for transfer to the wrapping machine feed, which, most likely, is of the magazine type.

When the production is small in volume, a belt feed is often tied into the line so that the filling and wrapping machines may run in series. As the production rate increases, the question arises as to whether two complete packaging lines should be put into operation or whether two filling machines should feed to one wrapping machine. If the second method is chosen, the belt feed is cut off and a magazine feed is provided for. The following discussion illustrates and explains the various ways in which magazine feeding may be accomplished.

Fig. 1 illustrates a vertical magazine in which the packages are fed from the bottom of the magazine by the use of a pusher slide. The magazine proper is indicated in the lower view at *A*. In operation, pusher slide *B*, moves in the direction of the arrow *C* to take a package from the bottom of the magazine at *D* and advance it through the channel as shown at *E*. The line *F* represents a sheet of paper, transparent cellulose, or individually printed label. This sheet is kept in place by the paper guides which also serve to direct its line of fall if it has been cut from a roll and dropped into position against a stop at the bottom.

A UNIT OPERATION OF FOOD ENGINEERING

Packaging

► An important step in package wrapping is the feeding of the packages to the wrapping machine. The type of package and the rate of its production largely determine what kind of feed should be used. In this article the magazine feed is discussed. Emphasis is placed on different designs of magazine feeds which may be used. Their construction and operation are explained in detail.

This is No. 6 of a series on unit operation of food engineering.

AS the package is forced along the channel and through the zone occupied by the sheet, the wrapping is folded part way around the carton. As a result the first end folds are made by the time the package reaches its position at *G*. Although the forming of these end folds is an important step in carton wrapping, it is not the purpose of this article to go into the details of folding. Folding devices vary according to the type of wrap used and shape of the package.

The vertical magazine has a few features which do not occur to the average mechanic unless he is familiar with them. For example, the back plate *H* is higher than the sides of the magazine indicated at *A* and A^1. This back plate permits the person loading the magazine to line the packages up against the projecting surface so that they will more readily enter through the curved edges at the top of the magazine without jamming or toppling off. Screws at *J* hold the sides of the magazine in place on the back plate and because of the angular ends bent around the back plate, permit the sides to be adjusted across the dimension *K*, in the plan view, to accommodate varying widths of packages. Elongated slots are provided at the screws for this purpose. This magazine is supported at *L* on the channel-shaped structure which guides the package *E* as it is advanced along the line.

At the lower left corner of the magazine is indicated a "safety plate." This plate is highly important in many cases as it prevents broken crackers or other flaky substances from getting between the pusher *B* and the package at *M*, thereby preventing interference with the correct registration of the package feeding.

Importance of this "safety plate" cannot be under-estimated as the gap *M* has been known to be large enough to permit entrance of the operator's finger when the hand is carelessly placed on the plunger slide.

The magazine shown in Fig. 2 is

(Continued on page 461)

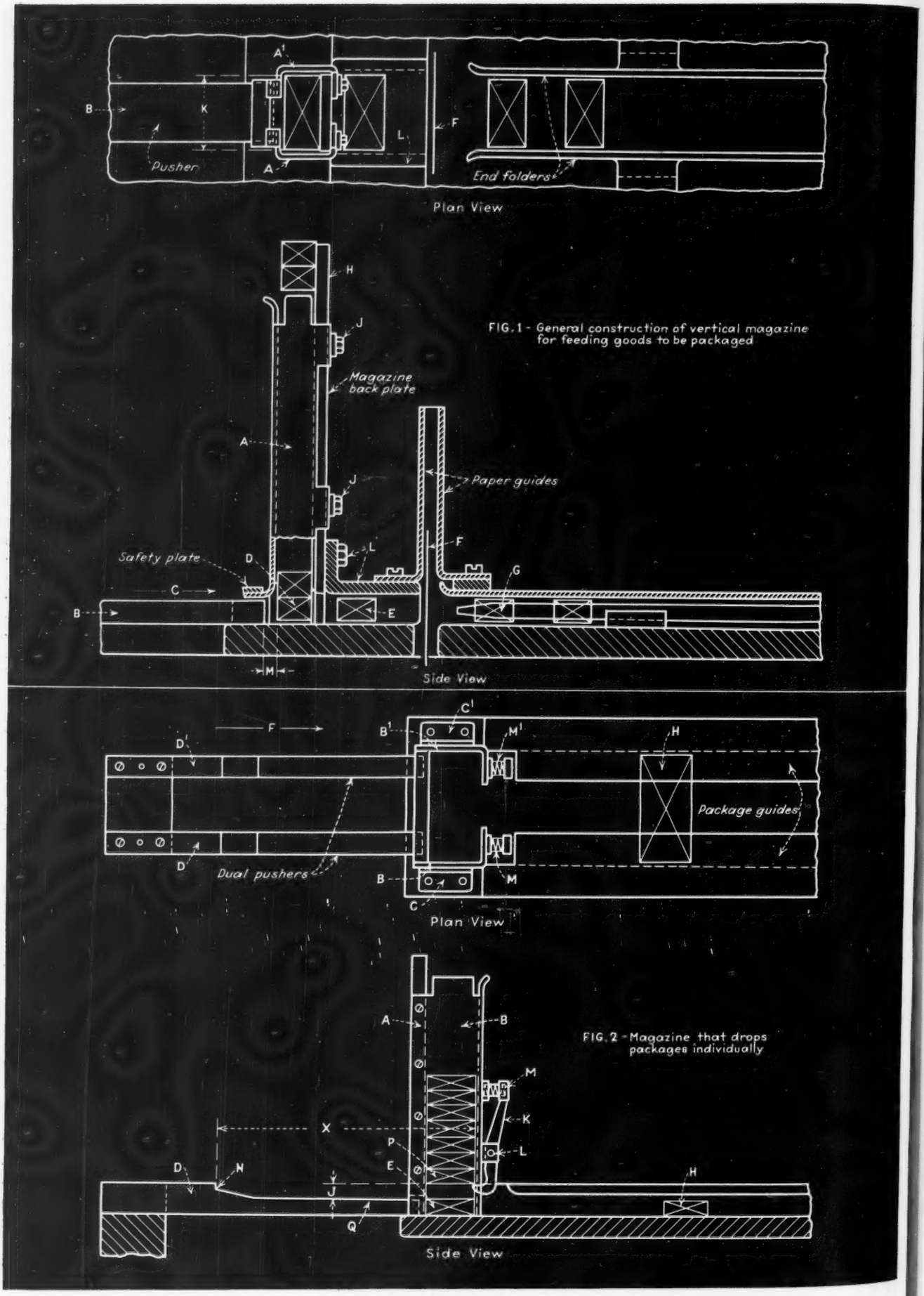


FIG. 1 - General construction of vertical magazine for feeding goods to be packaged

FIG. 2 - Magazine that drops packages individually

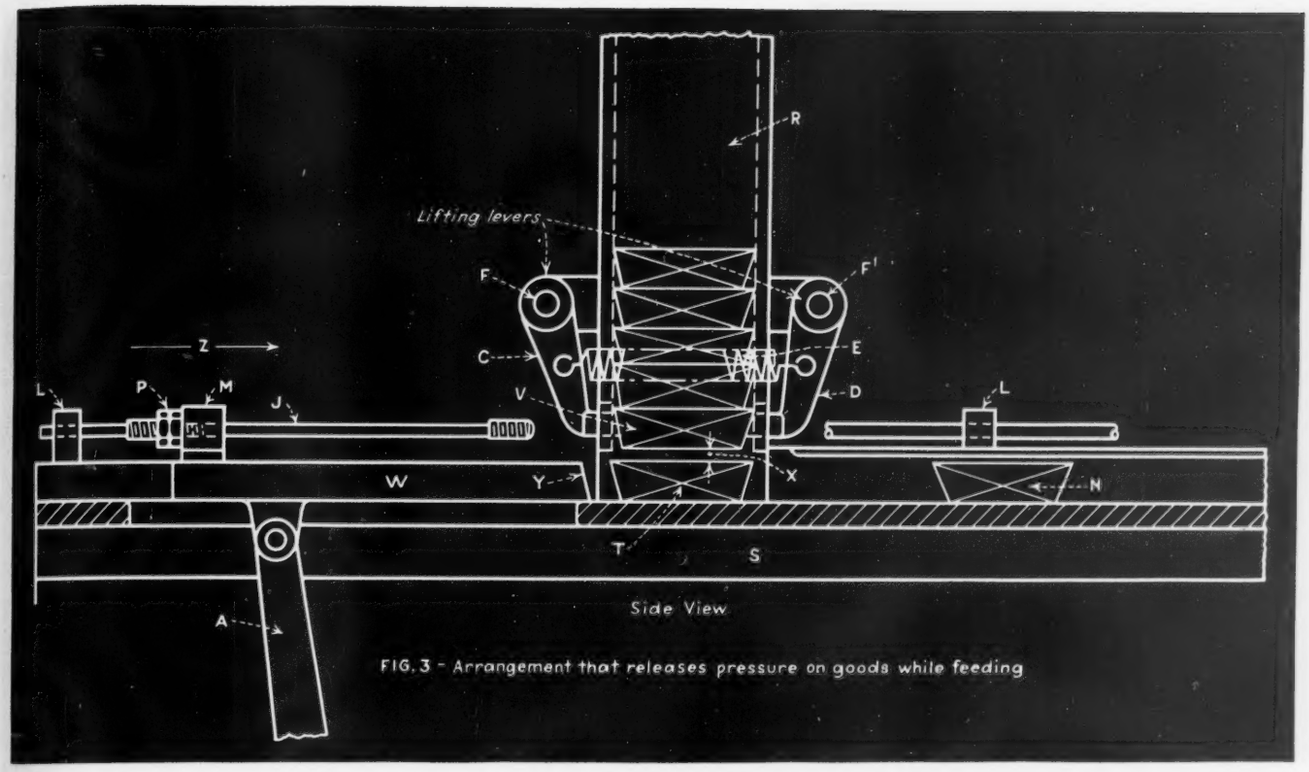


FIG. 3 - Arrangement that releases pressure on goods while feeding

in reversed position on the wrapping machine. Its back plate *A* is at the left of the illustration and its side guides *B* and *B*¹ are attached directly to the edges of the back plate by means of filister head screws which make the magazine non-adjustable for size. Angle plates at *C* and *C*¹ support the magazine from the sides. In this case the pusher has a dual construction consisting of two bars *D* and *D*¹. They contact the side of the lower package *E* near each end as the pusher travels in the direction of the arrow *F*. By this action the bottom package is moved to the position *H*. To provide for freedom of movement, there is a space *J* between the package conveyed and the next package in the magazine. This space is obtained by two pawls pivoted about pin *L* as a center to hold up the stack of packages in the magazine so that the pusher will not rub against the underside of the bottom package in the magazine as the package *E* is being pushed to the position *H*. Springs at *M* and *M*¹ are to hold the pawls *K* in the position shown. The pawls at each end of the magazine are identical in construction and operate through direct control with the shoulder *N* on each of the pusher rods.

As the pusher shown as *D* conveys the package into the machine, the shoulder at the line *N* travels as indicated by the arrow *X* until this shoulder strikes the end of the pawls at *G*. The pressure causes the pawls to release the lower package at *P* and lets that side of the package drop down on the beveled surface of the slide as it begins its backward movement. The dropping of this side of the package while the other side is momentarily held in place, permits the hooked end of *G* of the pawls *K* to come under the next package in the magazine and hold up the stack while slide *D* moves back from right to left in the reverse direction of the arrow *X* (*F* of the plan view). Package *P* drops down and rides along the surface *Q* until it is permitted to fall off the end of the slide and into the position *E*. The portion of the magazine side extending between the pusher rods *D* and *D*¹ prevents the packages from riding back on the pusher. This operating sequence is repeated for each package fed from the magazine into the machine. Variations of this type of magazine feed can be constructed for units other than carton packages. Fig. 3 shows a package-dropping mechanism that is

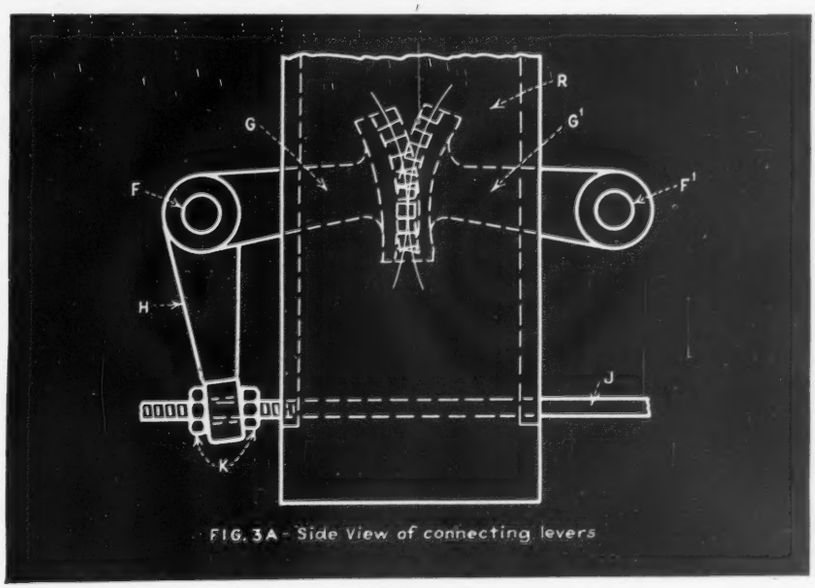


FIG. 3A - Side View of connecting levers

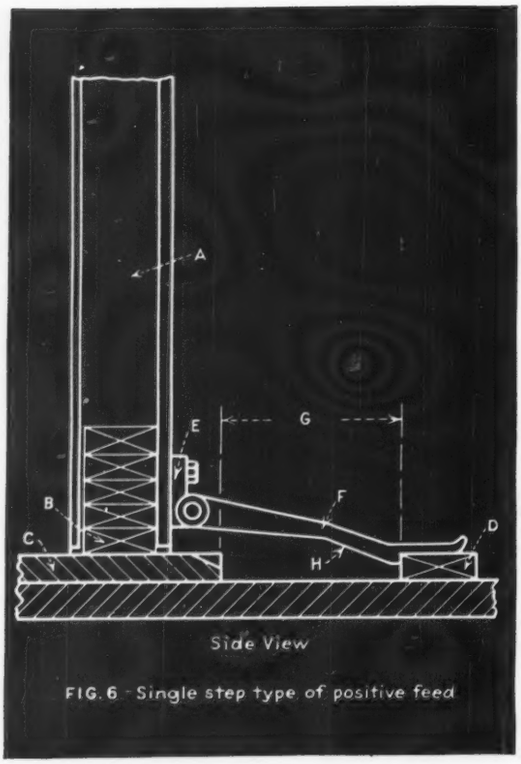


FIG. 6 - Single step type of positive feed

used for chocolate cakes or bars. Without some such construction the surface chocolate would be scraped and scratched as the cakes are fed into the machine.

ONLY one view of this construction is shown. The magazine *R* is the same in both the main view and in the small partial view numbered Fig. 3A. The base of the wrapping machine is indicated at *S* and the chocolate cake is shown as having been dropped into place *T* from position *V* in the magazine *R*. At *T* it is ahead of the pusher slide *W* and in position to be fed into the machine in the direction of arrow *Z*. Since the sides of the molded chocolate cakes are bevelled, the end of the pusher is likewise bevelled at *Y* so that there will be a tendency to lift the cakes as they are pushed into the machine. Lever *A* is used to operate slide *W*.

The cake or bar at *V*, together with the entire stack of cakes in the magazine above *V*, is supported by a pair of levers *C* and *D* which clamp the side of the cake. These levers are held against the cake by the spring *E* attached to both levers and pivot on the studs *F* and F^1 in brackets on the sides of the magazine. In this connection, reference should be made to the small view where the two arms *G* and G^1 are shown. These arms are made with gear teeth so that both levers operate in unison while clamping the cake at *V*. Lever *H* connects with a rod *J* passing through a hole in the lower end of the lever. Adjustment nuts *K* on both sides of the lever hold it in place. The rod *J* is also shown in the main view. It is supported on the side of the machine by bearings *L*. Mounted on pusher *W* and free to slide over the rod *J* is a block *M*. After the cake at *T* has been pushed by the slide *W* into position *N*, the slide returns in the reverse direction of the arrow *Z* and causes the block *M* to strike the nut *P*. In the drawing, the block *M* is shown in contact with *P*. This contact pulls the rod *J* back slightly and through the medium of nuts *K* causes lever *H* to rock the arms *G* and G^1. Rocking of the arms in turn causes the levers *C* and *D* to open and drop the cakes from the position *V* to position *T*. Immediately as the slide *W* begins to move forward to push the cake from *T* along to *N*, block *M* leaves the nuts *P* and permits the levers *C* and *D* to close on the next lowest cake in the magazine as it drops down. This action holds the stack of cakes so that there is a slight gap at *X* and prevents the top surface of the cake at *T* and the bottom surface of the cake at *V* from rubbing together and scratching the chocolate. The actual design of the gripping levers *C* and *D* depends on the nature of the items handled. The contact point may be curved or fiber-surfaced as the bars or cakes require.

A feature of the magazine illustrated by Figs. 1 and 2 is the considerable travel of the cartons or cakes as they are pushed by the feeder slide. As the reason for this is not readily apparent, attention is called to the magazine construction shown in Fig. 4. In that construction is an arrangement to reduce this travel. It is obtained by setting the magazine at an angle to make room for the paper reel.

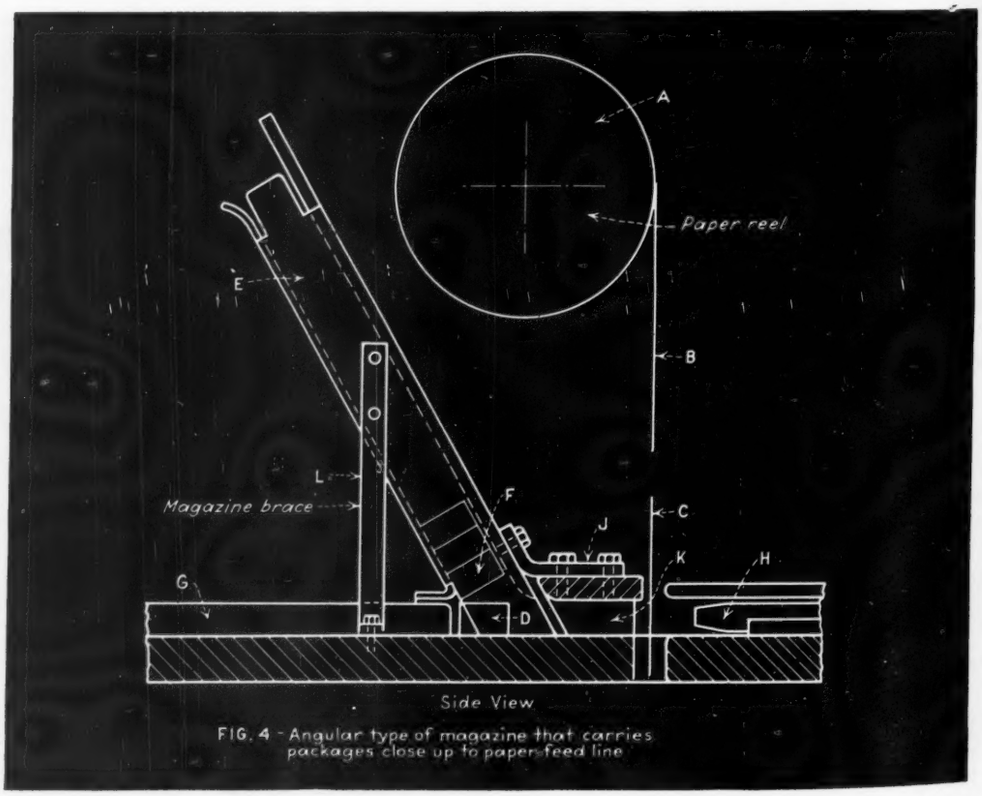


FIG. 4 - Angular type of magazine that carries packages close up to paper-feed line

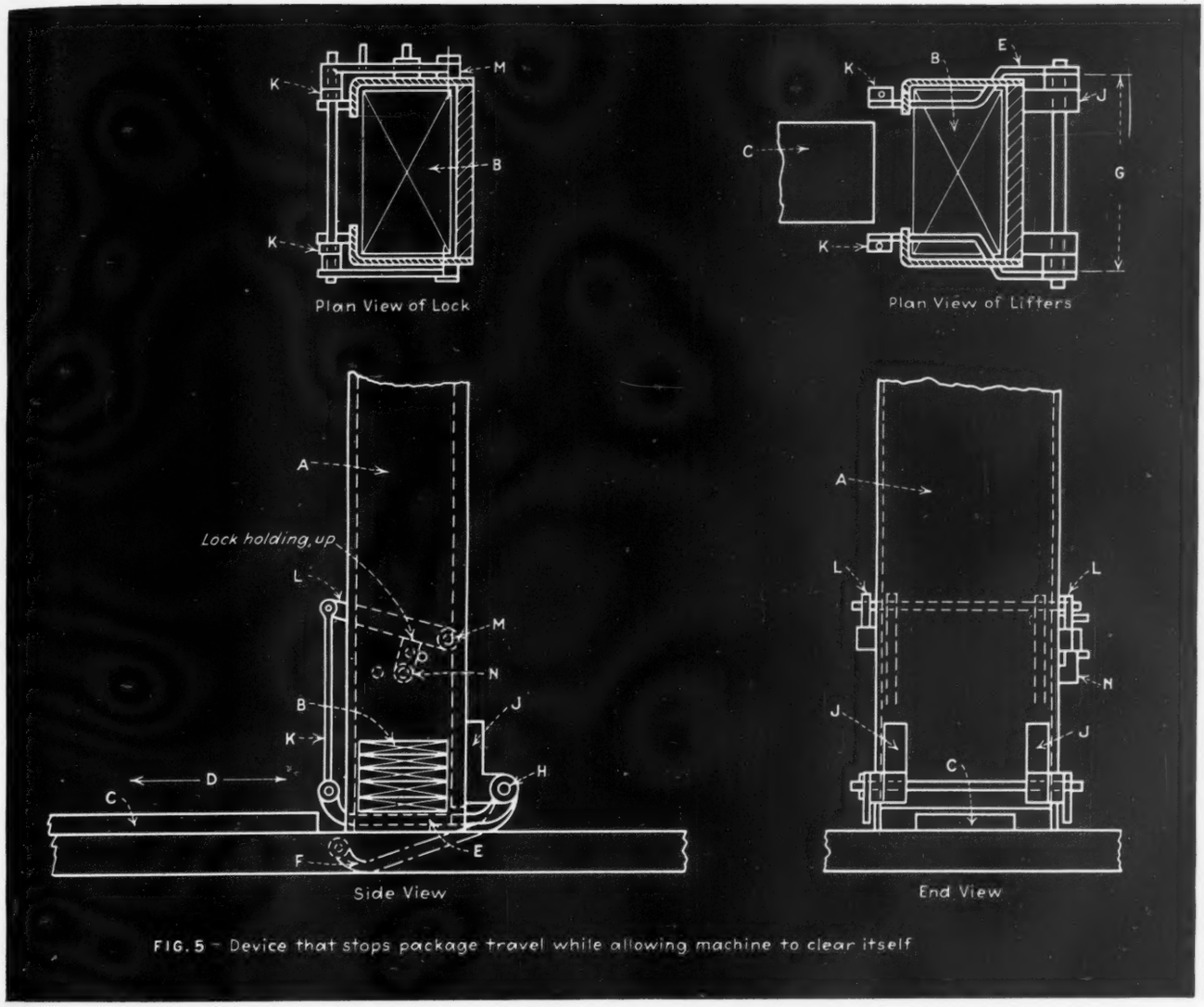


FIG. 5 – Device that stops package travel while allowing machine to clear itself

IN Fig 4 the reel *A* feeds the paper as shown at *B*. The paper is cut off so that the sheet to wrap the cake or carton is in the position *C*. By setting magazine *E* on an angle, the roll of paper at *A* is cleared and the cake or carton *D* is delivered as near to the paper at *C* as is practical. This construction arranges the cake or carton in the magazine so that the lower one is as indicated by *F*. Pusher *G* operating in the usual manner moves *D* through the paper zone at *C* and into the end folding position *H*. The magazine in this position is supported by a bar *J* bolted to the package guide *K* and by a brace *L* connecting the side of the magazine with the frame of the machine.

For certain types of goods it has been found desirable to include in the magazine structure a device, manually operated, which stops the feeding of the packages into the machine but permits the machine itself to operate. This mechanism is for the purpose of clearing the machine of wrapped packages without the necessity of emptying the magazine. It is a particularly desirable feature when the packages being wrapped are thin and the magazine contains so many items to be wrapped that several minutes would be required to clear the machine if something went wrong with the wrapping mechanism. A device of the type illustrated in Fig. 5 may be employed to interrupt or cut off the magazine feed. This one is hand operated. The attendant merely flips a lever to stop the feeding of the units.

As indicated in Fig. 5, magazine *A* is filled with thin packages such as are shown at *B*. The slide *C* moves rapidly back and forth as indicated by the double arrow *D*. At each full stroke of the slide a package is carried into the machine and another package is dropped in place to be subsequently carried in. This slide *C* operates against two-thirds of the central portion of the package.

OUTSIDE of the slide is a pair of arms *E* which go under the stack of packages but do not interfere with the operation of the machine feed when the arms are normally in the position shown by the dotted and dashed lines at *F*. As shown in the plan view, these levers are shaped so that the units to be wrapped can slide between them and the machine end as indicated at *G*. These arms are pivoted at *H* in the supporting brackets *J*. They are also connected with tie rods *K* to side levers *L* which pivot at *M*. When the levers are in inoperative position, they rest against a stop pin. Another detail of this mechanism is the quarter-turn block *N*. When turned by the operator into the position shown, the levers

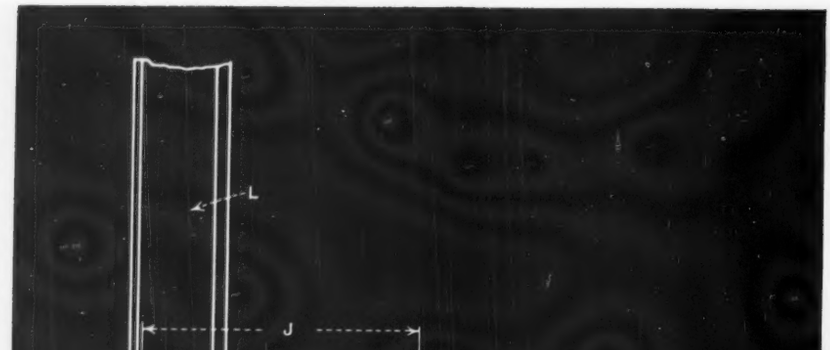


FIG. 7 - Double step positive feed with dual pawls

L hold the package lifter E in the "up" position so that the stack of packages to be wrapped is held in such a way that the bottom package will clear the slide C as it moves back and forth. Under these conditions the moving slide does not transfer packages into the machine. Since no packages are conveyed into the machine and no wrapping can be done, the machine soon clears itself. When the operator wants packages to feed into the machine N is turned 90 deg. and E drops to the F position.

WHEN handling many types of goods the pusher advances the package from the feeding magazine to its next or folding station, leaves the article there and returns to its starting point. Usually, the article will, of itself, stay in place at the end of the stroke. Sometimes if the articles are sticky or the machine is running exceptionally fast, the article or package has a tendency to rebound or stick to the pusher as it returns. Trouble of this kind is overcome by positive feeds such as shown in Figs. 6 and 7.

A single step positive feed is illustrated in Fig. 6. An important detail of this feed is a bracket E attached to the magazine A from which package B is advanced to position D by slide C. Pivoted on bracket E is the lever F which drops of its own weight behind the package and rests on top of it so that the package is held in a registered position at D. This position is reached through the action of pusher C which advances the package under the incline H and then recedes the distance indicated as G. During the backward movement of pusher C the lever F falls into the position shown in the drawing.

SOMETIMES the package feeding mechanism must be placed so far back from the next operative station that one stroke of the feeding slide will not be sufficient to carry the package into the desired position for the wrapping machine. This situation is corrected by a construction which might be termed a two-stage positive feed. It is illustrated in Fig. 7.

By this type of feed, designed as a two-level feeding slide, the package is advanced a distance J on the first feeding stroke. On the next feeding stroke, the package is moved to the position K from where it can be moved along to the wrapping mechanism. In the drawing the magazine is indicated by L and the first step lever M is pivoted from bracket N attached to the magazine. When the slide P is on the return stroke and the shoulder Q is at R, the packages at S and above press down on the package S^1 and cause it to drop onto the surface T which is the lower level of the double feeding slide. One forward stroke of the slide P moves the package to the first station where M holds it as slide P returns from position Q to position R. At the end of this back stroke the package S^1 drops off the end of the slide. On the next forward stroke of the feeding slide, S^1 is advanced to K where it is caught and held by pawl W. S is advanced to the former position of S^1 and the next package in the magazine takes the position vacated by S. From K the package may be moved along to the wrapping mechanism. The pawl W is pivoted at X from the side of the machine.

Pusher-slides with double-step construction become quite important in machinery for high speed operation as the two-step arrangement permits the use of a shorter stroke which in turn reduces the slide travel and speeds up the machine.

When three articles are to be bundled or wrapped together a make-up magazine of the type illustrated in Fig. 8 may be used. This magazine has a wide plate Y attached to the machine in the usual manner. To this plate are attached three channels Z in which are placed three stacks of the articles A to be wrapped.

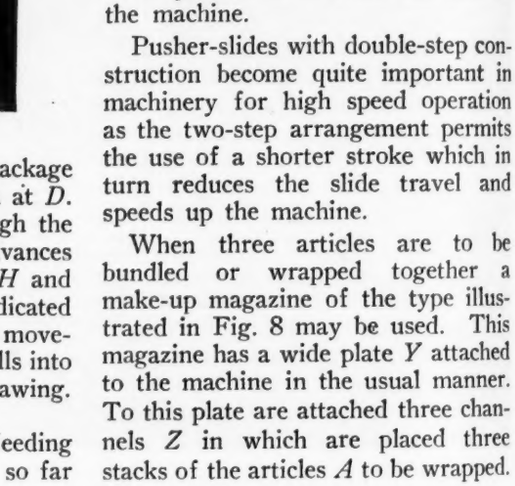


FIG. 8 - Method of feeding three columns of packages as a unit

On the pusher bracket *B* are mounted three package contact bars *C* which push the three packages out from the bottoms of the three separate channels. These items are then wrapped together as one package while they slide through the machine.

AN interesting type of magazine is represented by the drawing in Fig. 9. The purpose of this magazine is to turn the packages endwise through 90 deg. and also to turn them bottom-side up as they enter the wrapping machine from the cartoning machine. Without the operator touching the package, the magazine indicated at *D* receives the packages as they come along at *E* from the cartoning machine. As they enter the magazine, the packages slide over a lifting plate *F* which carries them upward in the direction of the arrow *G* to the position *H*. At this point, a slide *J* advances in the direction of the arrow *K* under the package *H* as a plate *F* drops back to pick up another package. This continual pushing up of the packages one under the other forces them through the magazine *D*. As they travel over the loop at the top of the magazine, the packages are turned over and revolve through 90 deg. until they assume the position *L*. The packages are now ready to be fed by slide *M* into the wrapping machine as indicated at *N*. These auxiliary slides and the lifting plate are operated by a suitable mechanism synchronized with the operation of the wrapping machine.

In the handling of certain types of packages, the question of weight enters into the design of the magazine. Sometimes it is necessary to retard the packages at certain points in the magazine to avoid a jam at the feed slide. Figs. 10 and 11 represent two types of magazine in which retarders are employed. Both of these magazines are curved at their lower ends so that they lead the package almost up to the paper line at *J*. In Fig. 10 the magazine *A* is equipped with two retarders. One is in the vertical section of the magazine. The other is near the lower end. The upper retarder takes the form of a spring pressure lever while the lower one is a lever used as an escapement. Both levers *B* pivot at *C*. The lower lever has an adjustable screw *D* which can be set to permit the packages to slide under the lever with very little momentum. In operation the slide *E* contacts the package at *F* and carries it to *G*. At the same time the slide holds back the package at *H* while on the forward stroke and pushing *G* through the paper zone *J*. When the slide *E* returns to its starting position, the package at *H* falls into position *F* under lever *B* which is set so that the package will just pass at the end of the slide. The paper guides are indicated at *K*. Instead of an adjustment screw, a spring *T* under compression against a block at *V* causes the upper lever to check the fall of the packages in the magazine so that the pressure at the lower end will not be too great for the lever.

Unless some such retarding device is used, the magazine type of feed is practically useless for packages weighing more than a few ounces. The problem arises not so much from the weight of the individual package as from the total weight of packages in the magazine. In some cases this weight is such that retarders of different design than those illustrated in Fig. 10 are desirable. Otherwise the capacity of the magazine would have to be reduced.

THE view in Fig. 11 shows the same type of magazine with a belt *M* which revolves in contact with the packages as they pass along. A slot is cut outof the side of the magazine to make possible the use of the belt. Bearings at *N* support the belt pulleys. Another belt at *P* is sup-

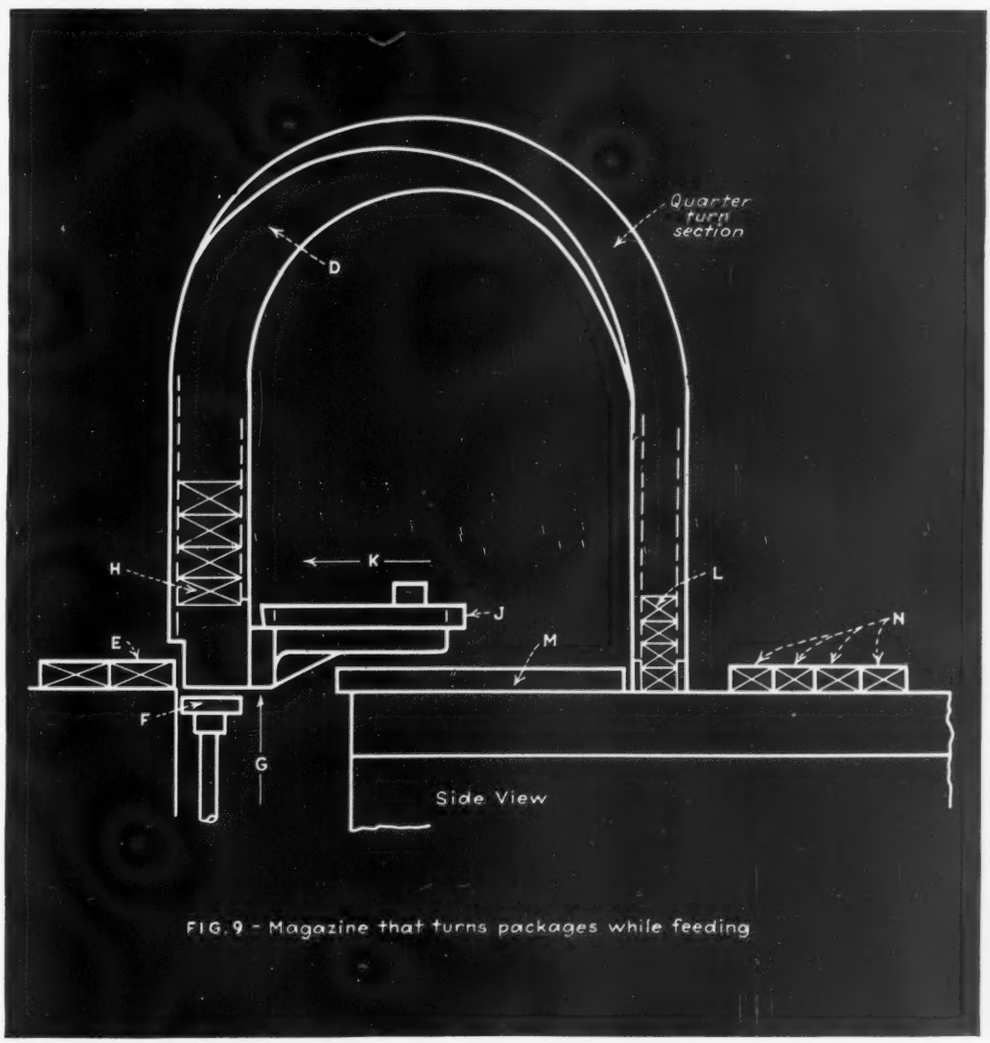


FIG. 9 - Magazine that turns packages while feeding

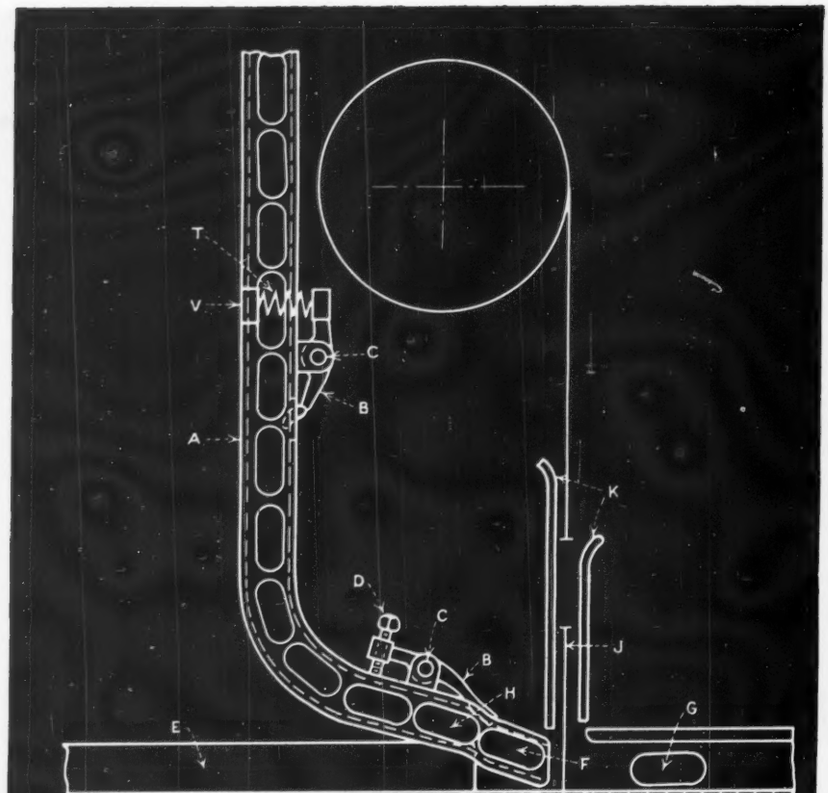


FIG. 10 - Package trap in curved lead magazine

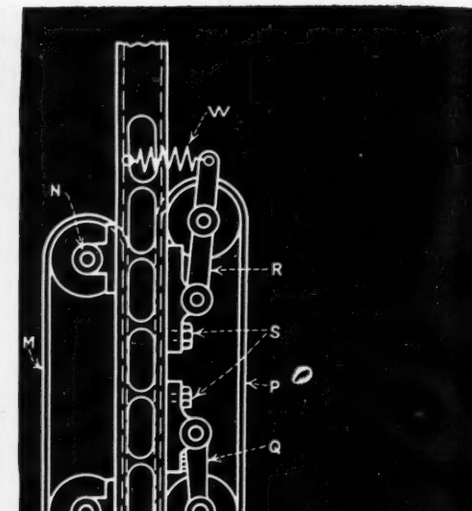


FIG. 11 - Controlling package drop by means of belts

ported by levers *Q* and *R* on brackets *S*. This belt is kept under spring tension by the coil at *W*. These coil springs can be made stiff enough to make the belt act as a retarder to support the weight of the packages above the belt. The retarding action should be such that the weight of the goods will just carry the packages along through the magazine. In some machine constructions these belts are power driven at the predetermined speed under control from the wrapping machine itself. Power driven belts are particularly desirable when the magazine structure is exceptionally long and the packaged goods are carried into the machine from the floor above.

As ingenious as the magazine designs may be, no general rule can be made as to when they may be used advantageously. Magazine feeds are used particularly for gum wrapping because of the tendency of the pieces to stick. The slides readily strip one stick from another. Other small items when wrapped individually are as a rule fed from magazines; however, when bundled, they are fed from belts. Cartons of crackers and the heavier goods are usually fed into the wrapping machine on a belt. From this it can be reasoned that each package must be handled in the way that will give the best wrapping machine operation. If magazine feeding is required at least one of the foregoing designs of construction should prove helpful in indicating the lines that may be followed in solving any problems that arise. Sometimes these problems arise from the shape being wrapped. The convex surface of an almond bar presents a problem quite different from that of the flat chocolate cake. The flat cake works well from a magazine.

In* FOOD INDUSTRIES *for October, 1936

Materials handling—the unit operation of food engineering that is most commonly met with—is so familiar that there is danger of its becoming disregarded. But economical materials handling may often mean the difference between profit and loss.

With this in mind, FOOD INDUSTRIES will devote a large part of its October, 1936, number to discussion of what is new in handling equipment and methods.

EVERYDAY OPERATING PROBLEMS OF FOREMEN · SUPERINTENDENTS · PRODUCTION MANAGERS

When Things Go Wrong

WHENEVER a company gets into trouble with the food laws of the country, whose fault is it?

Who is really to blame? And who takes the rap? Seldom the same person. Nine times out of ten the fellow who pulls the boner is some one out in the plant. But the company gets all the blame.

What the Boss is Paid For?

Being the big boss is no fun. In fact it is about 99 per cent grief all the time. That's why they have to pay a lot more money to the fellow higher up. If he never had anything else to do but say "Yes" and sign his name, when capable, long headed, farsighted, shrewd, aggressive, loyal business subordinates (quite a list, isn't it?) came to him for a decision on a well thought out plan that is a sure-fire success—one that couldn't possibly fail—then his salary would only be about $50 a week. Anybody could fill such a job.

As a matter of fact the big boss, the G-M, the brass hat, or whatever you call him, has to supply whatever of these qualities the help lacks. Or else the business goes to pot. Which brings us up to the troubles in the plant that result in food law violations.

Where Troubles Start

In more than 28 years of intimate contact with food manufacturing in many lines we have actually seen only two cases where the management deliberately tried to put one over. Remember that. Only two cases where the head of the company *knew* he was ordering a violation of the food laws. One man lost his business. The other lost his job.

Perhaps there are many other cases that we were not smart enough to see through. But we have known of hundreds of food law violations caused by ignorance, accident and mistakes. Also we have seen costly spoilage result from the same causes. As a matter of fact it doesn't make a whole lot of difference which it is. The point is that ignorance, accident and boneheaded mistakes cost money.

EVERY reader of FOOD INDUSTRIES is urged to comment on subjects discussed in these pages. If you have any ideas, let's have them.

Forgot to Adjust Formula

Ignorance cost the company money the time old man Johnson ordered a carload of fresh apples instead of dried apples for his moist mince meat. He had been foreman in charge of his department for better than twenty years. He forgot to change the formula when he used fresh instead of dried apples. Everything spoiled. But the superintendent who approved the purchase order must have been dreaming when he did it. Otherwise he would have headed off trouble. The president, not old man Johnson, had to explain to his board of directors why the department had lost money.

Ignorant or Uninstructed Workmen

Poor judgment is responsible for putting ignorant operators on jobs where they are responsible for maintaining quality. In foods, it is so easy to mix this and that, cook it, and have a product that looks good and tastes good. But it may not be as good as the legal standard. Like the U.S. standard for preserves, for example, if the law says it must have so much fruit and so much sugar, the man who weighs out the batches has all the profits or losses in his care—temporarily. If he is careless or doesn't know what its all about, and adds more syrup instead of whole fruit with the idea of saving time or effort, the product may be illegal. It may even get seized by the government even though the big boss gave orders to produce a legal product, fully up to standard in every way. Such a seizure may cost the company $500 even if only one case of goods is caught.

In such a case who is really to blame? Somebody is at fault. That's plain or it wouldn't have happened. But what is to be done about it?

What Would You Do?

Just pretend you are president of a company. You would have a superintendent and a foreman between you and Mike Dragazitszh. Maybe you would have a vice-president and a production manager also. Mike is the guy who opens up the barrels of cold packed fruit and weighs it out. He finds the fruit floating in a syrup. He takes a pail and lifts out 100 lb. for a batch. When he gets farther down into the barrel there is less fruit and more syrup. The last batch is the illegal batch. That one is the baby that got the company into trouble. After a trip to Washington, and lawyers' bills, you figure out that it cost your concern just $500 to find out that somebody pulled a boner.

Who is to blame? How should it be corrected? Who is to do it? How would you prevent it from happening again? Should Mike be fired?

Resourceful

BANANAS, a tropical fruit, are peculiarly susceptible to cold. If their temperature falls below 54 deg. F. (some authorities say 50 deg.) the life principle on which their "keepability" depends seem to flicker out, and the bananas quickly spoil.

It happens that the problem of keeping bananas warm became an acute problem of distribution for the Jewel Tea Company during a special drive on this fruit through the weeks of Jan. 25 and Feb. 1, for Chicago and vicinity experienced 20-below-zero weather most of that time. Jewel Tea's insulated trucks were not equipped for heating and 60,000 lb. of bananas had to be distributed during the cold spell. The lack of regular heating equipment was remedied by placing several milk cans full of boiling water in each truck body. No spoilage occurred.

NEW DISCOVERIES AND INVENTIONS

BRIEF REVIEWS OF NEW METHODS, PROCESSES, RESEARCH AND PATENTS IN THE FOOD INDUSTRIES

Garlic Has Germicidal Power!

EVERY so often some old timer resurrects a quaint notion that garlic will prevent spoilage. Apparently the idea originated in Germany, at least a century ago. The first time it came to our attention was in 1915 or 1916. The idea at that time was that a few cloves of garlic in a barrel of dill pickles would prevent all spoilage. At the time we tried it, nobody really cared because goods were going into consumption at a remarkable rate. And nobody would pay even a fair price for garlic-flavored dill pickles.

But, after all, garlic has now been shown to possess definite germicidal powers. Crushed garlic gives off vapors that will kill several different kinds of bacteria. However, this bactercidal power is lost if the garlic is boiled or heated under steam pressure to 22 lb. per sq. in. The volatile material really kills the bacteria, not merely restrains their development.

Abstracted from "Bactericidal Effects of Vapors From Crushed Garlic" By Walton, Herbold, and Lindegren, Food Research, 1, 163. 1936.

Salometers Can Be Very Misleading

SALOMETERS are a special type of hydrometer. They are used to measure specific gravity of a liquid. Instead of being marked to read the specific gravity, they are marked to read the percentage of saturation of a salt brine. A saturated solution of salt is about 26.4 per cent salt. This is called 100 deg. salometer. Pure water is called 0 deg. salometer.

Because a salometer is made to measure specific gravity of salt and water solutions, it must be used in salt and water solutions only, or it will not read correctly. If a salometer were placed in a sugar and water syrup, it would read a definite percentage of salt. But that would be wholly incorrect. No salt would be there.

Salometers are important control instruments for the use of picklers, olive bottlers and sauerkraut makers. In pickling they seem to read fairly accurately, but in this investigation of sauerkraut analysis they were found to be very inaccurate. A salometer is more accurate when the solution is only salt and water, and much less accurate when the salt percentage is low and lots of other substances are also present.

Kraut brine contains water, salt, lactic acid, acetic acid, protein, alcohol, carbon dioxide and sometimes sugar. Protein and lactic acid increase the specific gravity of water in which they are dissolved but to a lesser extent than the same amount of salt. Alcohol lowers the specific gravity. Acetic acid increases it about one-fourth as much as salt. Dissolved carbon dioxide, mineral matter and any sugar that has not been fermented also affect specific gravity. Consequently a salometer reading of kraut brine does not mean a thing in terms of actual percentage of salt.

Yet uniformity of salting is a most important feature of kraut manufacture. About the best that can be said is that the salometer reading on kraut juice is a fair index of total solids present in solution. Actual analyses show this very clearly.

The old practice of draining off part of the juice at the time the kraut is being trod down is condemned. It loses too much salt.

Abstracted from "Accuracy of Certain Methods Used in Analysis of Sauerkraut" By C. S. Pederson and C. D. Kelly. Food Research, 1,277. 1936.

Full Flavored Fruit Juices Natural Vitamin Content Kept

GROWING demand for foods high in natural vitamin content has resulted in a wide market for packaged fruit and vegetable juices. Heretofore some of these juices could be extracted and sterilized with only slight change in flavor and vitamin properties. Others suffered a very marked change. Now all can be obtained and packaged in liquid or frozen state without any deterioration in flavor or vitamin content. Details of the method by which these results can be had are covered by U. S. Patent No. 2,047,935. It was issued as of July 21 to George D. Beal, Assistant Director, and Ronald B. McKinnis, Fellow, Mellon Institute of Industrial Research, Pittsburgh, Pa., and assigned to Continental Can Co., Inc., New York, N. Y.

According to the method the fruit is sterilized externally, washed, freed of its juice under sterilized and protective atmosphere conditions, and packaged in sterile containers without exposure to atmospheric oxygen. The method presumes pulp and juices of fruits to be bacteriologically sterile and enzymes normally present to be inactive as long as skin or rind of fruit is unbroken.

The fruit is sterilized by dipping into hot solution of sodium hypochlorite, (1 ounce per gallon of water), or similar germicide. Time is two minutes for oranges in a 212 deg. F. solution. This period is long enough to kill all bacteria, molds, or yeasts without heating up interior of fruit.

After washing in cool water the fruit is reamed or extracted by auger press in a closed and sterilized chamber. Juices fall into a closed, sterile sump and through strainer for transfer to storage tank. In all these steps the juice is protected from an oxidizing atmosphere as well as from micro-organism infection.

From the storage tank the juice is pumped to a chamber in which it is subjected to a vacuum to remove all traces of free-oxygen-containing gases and then to an inert gas—CO_2, H_2 or N_2—under pressure until actually sealed in sterile cans or in sterile containers suitable for freezing.

Cottonseed Oil Margarin

BY ITS taste and spreading properties the wise identify high grade butter from margarin. But margarin has not previously been made so expertly from cottonseed oil.

When hydrogenated as specified in U. S. Patent No. 2,047,530 dated July 14 cottonseed oil undergoes a great reduction in linoleic acid glyceride content with the formation of relatively large quantities of iso-oleic acid glycerides and relatively small quantities of saturated acid glycerides. These changes result in an oil which churned with milk in the ratio of 4 to 1 and subsequently chilled, kneaded, and salted gives a product claimed to be equal to or even superior to natural butter in its physical properties.

Cottonseed oil or mixtures of cottonseed oil with peanut butter or corn oils when hydrogenated to have a melting point of 90 to 95 deg. F., a setting point of 72 to 79 deg. F. and an iodine number of 65 to 73, contain from 18 to 25 per cent saturated fatty acids, 0 to 5 per cent linoleic acid and the remaining per cent (total 100) oleic and iso-oleic acids of which 15 to 20 per cent is preferably iso-oleic acid.

Hydrogenated oils having these chemical and physical properties give a margarin which will spread readily at 45 deg. F. At 40 deg. F. and lower it spreads better than natural butter. It softens less at 80 deg. F. than natural butter yet is not chewy or waxy in the

mouth. It melts quickly enough in the mouth to free the milk held in emulsion and to give to the product a pleasant flavor and taste.

This patent has been assigned to the Best Foods, Inc., New York, N. Y., by Hans W. Vahlteich, New York, N. Y., Carl H. Haurand, North Plainfield, and Ralph H. Neal, Bayonne, N. J.

Continuous Inspection by Electric Eye Warns of Filter Troubles

BY MEANS of a new gadget a Klaxon alarm sounds and a red warning light appears when a liquid becomes cloudy or turbid. Liquid coming from the Sweetland filters at California & Hawaiian Sugar Refining Corp., Crockett, Calif., goes through their new patented photoelectric clarity meter. If the solution is clear, nothing happens. If there is filter-trouble and the liquid is cloudy, the alarm starts and the trouble can then be located for immediate correction.

The plan is simple. The liquid flows through a stream-lined cell that has two ports or windows at right angles. Into one of these shines a 50-cp. spot light. At the other port is the gas filled caesium photoelectric cell. If the liquid is clear, no light is reflected crossways onto the photoelectric cell. If it begins to get cloudy, the amount of light reflected crossways to the cell will be proportional to the cloudiness. This light will cause a small electric current to flow. This is amplified in a single stage thermionic circuit.

When the current in the plate circuit reaches 2 milliamps, the alarms begin and keep going till the trouble is corrected.

Air bubbles in the filtered solution will also touch off the alarm.

Abstracted from "Turbidity in Sugar Refinery Products" by T. R. Gillett and A. L. Holven, Ind. & Eng. Chem. 28, 391, 1936.

How to Store Black Walnut Meats For Two Years

SHELLED black walnut kernels cannot be stored very long without special precautions or they go rancid and develop very bad flavors. To improve the keepability of black walnut meats a number of different tests were made as reported in this article.

Partial drying to remove 40 per cent of the moisture did not help when used alone. Sealing the kernels in screw-cap bottles produced only slight improvement when stored in ordinary cellars. It might have been better had the containers been actually air-tight.

Storage at the freezing point, where the nut meats were in screw-cap bottles in which the air had been replaced by nitrogen, hydrogen or carbon dioxide, was able to keep the product sweet for two years. Nitrogen-filled containers kept sweet for three years. Storage below the freezing point in air, vacuum and nitrogen also kept the nuts in excellent condition for three years.

Recommended storage procedure is under nitrogen in tightly sealed containers at temperatures near the freezing point. Still lower temperatures will do just as well but have been proved unnecessary.

Cellar storage in containers that are actually air-tight was better than storage in glass jars with screw-cap closures that were not air-tight. Though the air-tight container without gas was an improvement. it was not commercially satisfactory under cellar temperatures.

(*Editor's note: This research apparently omitted investigation of the patent literature. Several phases of storage and shipment of food materials in vacuum and inert gas were patented by Thomas M. Rector, now of General Foods Corporation, many years ago, and have been in commercial use since 1924. These are the so-called Vitapack patents. Also see U.S. Patent No. 2,044,639, recently issued to Continental Can Company.*)

Abstracted from "The Storage of Black Walnut Kernels" by R. B. Dustman. Food Research, 1,247. 1936.

Why Honey Turns Dark and Loses Water in Storage

ALTHOUGH not a complete answer to the most serious problem regarding honey, this research suggests that the darkening of honey in storage is probably due to the instability of the fructose itself. Fructose is the principle sugar in honey. Hence storage under refrigeration at 40 deg. F. seems to be the best way to prevent the discoloration. Low temperatures like this also slow down other chemical changes that take place.

Loose screw-caps on the jars is one other cause of certain changes in honey. They are not air tight and a measurable amount of moisture, about 2 per cent, escapes in the course of time at room temperature. This is lessened by storage at lower temperatures.

Abstracted from "Effect of Processing and Storage on Honey" by Lynn, Englis and Milum. Food Research 1,255; 1936.

How Bacteriological "Flow Sheet" Locates Cause of Green Meat

AMONG practical men in the meat packing field the greenish discoloration in meat, cured or fresh, is often blamed on "under cure." But when truly under-cured meat is heated by boiling, or in the smoke house, it turns gray—not green. There are discolorations due to true under-cure, and there are other discolorations caused by bacteria. Some bacteria cause green discoloration by oxidation while other kinds cause it by formation of hydrogen sulphide.

By constructing a bacteriological "flow sheet," the points of entry of the responsible bacteria can be discovered. The flow sheet is not shown, nor is there any mention of the place where the bacteria enter the process, nor is there any mention of the improvement in methods of plant operation as a result of these discoveries. But a new laboratory method of identifying some of the offending bacteria is given. Any one can now study his own plant operations and produce his own bacteriological "flow sheet," that is, if he is a bacteriologist or has one in his employ.

Very important is the following quotation. "The culture methods which have provided ample data for our "flow sheet" analysis of a process always reveal great numbers of oxidizing or of hydrogen-sulphide forming microörganisms accompanying green discolorations of meats. *Removal of these types of bacteria from the processing environment always eliminates green discolorations.*"

Abstracted from "Bacteriology of Green Discoloration in Meats and Spectrophotometric Characteristics of the Pigments Involved" By L. B. Jensen and W. M. Urbain. Food Research, 1,263. 1936.

Meat Color Protected

MEAT PACKERS, especially those having trouble with the color quality of their cured products, are advised to try dextrose in place of sucrose in their curing formulas. The Institute of American Meat Packers makes this recommendation as the result of tests made during the past year in its research laboratories.

The virtue of dextrose appears to lie in its ability to prevent oxidation of the meat. It is known as a reducing (oxygen-absorbing) sugar and exerts its reducing property whether it is used wholly or in part for the sucrose (cane or beet sugar) generally used. Honey, which is a mixture of two reducing sugars — dextrose and levulose — gave the same result as dextrose alone in the form of corn sugar.

The studies were made to determine means of preventing the fading or loss of color by hams, pork butts, sausage, and bacon. Pork butts cured without sugar faded very rapidly. Those cured with corn sugar and with honey kept their color. Those cured with sucrose, a non-reducing sugar, retained their color in part as to quality and permanence.

The beneficial effect of the sucrose seems to lie in the influence of moisture, temperature, time, acids of the meat, and the sugar inverting enzymes of bacteria and yeasts upon the sucrose for the formation of invert sugar. Invert sugar, like honey, is a mixture of two reducing sugars.

Meat Sauce From Milk

FILTER cake obtained as by-product from milk sugar manufacture is the latest source of protein for sauces having the flavor and aroma of roast beef. Chemical decomposition of these proteins through the action of heat and a mineral result in amino acids or amino-acid salts.

Chief among these decomposition products is glutamic acid and the monosodium salt of glutamic acid. They have formerly been made from wheat, gluten, soy bean protein, and similar proteins by heating with an acid to high temperature for long periods at atmospheric pressure or at retort pressures for shorter periods. Attempts to use catalysts were not successful because the known catalysts were not suitable for human consumption and could not be separated from the finished product without involving far too much expense.

The filter cake contains as much as 20 per cent calcium phosphates which Otto Ungnade, Mason, Mich., has found act as beneficial catalysts in the acid hydrolysis of the milk products. On this fact is based U. S. Patent No. 2,049,576 issued Aug. 4 and assigned to S. M. A. Corp., Cleveland, Ohio.

The effect of the calcium phosphates is such that the hydrolysis can be carried out at the constant boiling temperature of 110 deg. C. for the 20.2 per cent hydrochloric acid-water mixture and under atmospheric pressures. The concentration of the acid is kept nearly constant by the use of a reflex condenser. Hydrolysis of the protein uses up some of the acid.

Press cake from the manufacture of beet sugar is another source of protein with a calcium phosphate content which can also be successfully processed by this method.

Commercial use of these protein decomposition products is made in condiment preparations, soups, bouillons, and gravies.

Vitamin B_1 Artificially Synthesized

AFTER 26 years of experimental effort vitamin B_1 has been artificially synthesized by R. R. Williams, Chemical Director of the Bell Telephone Laboratories, and his coworkers.

Many other workers in all parts of the world have contributed to our knowledge of vitamin B since Eijkman in Java first suggested in 1896 that the lack of some such substance in polished rice was the cause of beri-beri; a widely prevalent oriental disease. It was not until 30 years later however that Jansen, while working in Eijkman's old laboratory in Batavia, succeeded in extracting small amounts of the substance in pure form. Better processes of isolation were announced in 1933. Provisional structural formula was ventured for it by Dr. Williams and his associates in 1935.

All the higher plants synthesize vitamin B_1 and presumably use it as part of their life cycle processes. All animals need it but are unable to make it. Extracting it from plants is laborious and expensive. Artificial synthesis carried out by means wholly different from those used by plants is effected by combining 2-methyl 5-brom methyl 6-amino pyrimidine with 4-methyl 5-beta hydroxy ethyl thiazole.

The earlier work was done at Columbia University with funds supplied by the Carnegie Institution. Later phases of the investigation were carried out under the auspices of Research Corp. of New York in the Research Laboratories of Merck & Co. with Merck & Co. funds.

Small Size Peas Have Most Vitamin C

Two different relationships between size of peas and their Vitamin-C content have been discovered. 1. In general the small seeded varieties have the highest Vitamin-C content. 2. Different sizes of the same variety of pea, obtained by sieving, differ markedly in their vitamin-C content. Small sizes have most Vitamin C.

Storage of peas under refrigeration at 1 deg. C. and 9 deg. C. results in almost no loss of the vitamin. But storage at room temperatures, 18 and 22 deg. C., results in very considerable losses of the vitamin.

Abstracted from "Vitamin-C Content of Vegetables. II. Peas" By G. L. Mack and D. K. Tressler, and C. G. King. Food Research 1,231. 1936.

Vitamin C in Apples Not Under the Peel

IT is often believed that Vitamin C is present in higher concentration near the peel of an apple. But tests with the following varieties do not result in marked decrease in the amount of Vitamin C. The Vitamin C value of the Arkansas Black is less than 2.5 units per ounce; Baldwin, 2.5-3.0 units; Delicious, less than 2.5 units; Gravenstein, 3.75 units; Jonathans, 1.5-2.0 units; Spitzenberg, 7 units; Winesap, 3.0 units.

Prolonged storage of the apples causes less destruction of Vitamin A than of Vitamin C. Destruction of the latter varies with the kind of apple. In the Jonathan it is less stable than in the Delicious.

Abstracted from "Vitamin Studies on Apples" By Manville, McMinis, and Chuinard. Food Research, 1, 121. 1936.

N.B.: These items are abstracts. They are not original articles. Furthermore they are factory men's abstracts, not chemists' abstracts. Also they represent the editors' interpretation of a scientific discovery in terms of factory practice. The scientific article or patent reads quite differently from what you see here.

Do you want more of these? Please write your wishes to the editors.

Sometimes Juice Will Ferment Even at 28 Deg. F.

BEFORE unfermented grape juice can be bottled the argols (crude cream of tartar) must be allowed to precipitate out and be removed. This requires storage for some time under one or the other of the following methods. I—Pasteurize and store the juice in carboys or jugs in a relatively cool room. II—Chill the juice and fill cement or wooden tanks without pasteurization and store in a colder room at 28 deg. F. The room is cooled by a unit cooler. Parts of the room may get as cold as 25 deg. F. Usually slush ice forms at the surface of the grape juice.

In general, the numbers of living microörganisms were smaller after three to six months of storage. Yeasts die more readily than bacteria. Benzoated juice shows a more rapid reduction in numbers at the start than plain juice. But four out of five tests showed an increase in mold content at the end of seven months.

The only safe method of eliminating mold seems to be to keep air from contact with the juice.

Even though the results of this test showed there was a general reduction in numbers of microörganisms, the author admits he cannot explain spoilage that has previously occurred under the same conditions of storage. He suggests that it may be caused by acclimated strains of yeast that can grow at low temperatures.

From the standpoint of quality of the juice itself, the cold storage method is superior as regards aroma and flavor. It also results in quicker precipitation of argols and in addition yields a clearer juice.

Abstracted from "The Preservation of Grape Juice. III. Studies on the Cool Storage of Grape Juice" by C. S. Pederson. Food Research 1,301; 1936.

Delicate Test for Blood Pigments

IN ORDER to be sure where the color comes from in cases of "pink" fat occurring on hams and bacon, a new laboratory test has been devised. It will produce a green color if the pink color originated from blood pigments.

Abstracted from "A Delicate Test for Blood Pigments" By L. B. Jensen and W. M. Urbain. Food Research, 1,275. 1936.

Has Central Storage and Dispensing

PROBABLY the most perishable of the flavoring extracts are the essential oils. As light and heat are their worst enemies, they are always kept under refrigeration and in dark bottles. All flavors should be stored in a cool place. However, some such as oil of anise, will solidify if the temperature is too low. We have not found that colors are particularly temperamental and will survive even high temperatures.

In all cases flavors are supplied for use to the cooking room in graduated containers with just sufficient flavor for the individual batch. These containers are calibrated to $\frac{1}{4}$ oz. to insure accuracy of measurement.

In cream work the procedure is somewhat different. The flavors and colors are mixed in a small container and the definitely measured quantity is supplied to the cooking room in a graduate. In this manner a color check may be made on the batch to estimate the amount of flavor present.

It is essential that one well-trained man measure all flavors and colors. Also that this man be the only one who has access to these flavors and colors. It is also important that he record his procedure; both for check up purposes and for emergency when he is not available for work.

As a rule our production is laid out at least one day ahead in a definitely planned manner. However, the flavors and colors are not measured until the batch has been weighed out. We adopt this policy, despite its apparent inconvenience, to insure the balancing of the amount of flavor and color to the size of the batch. Were the flavors and colors measured out beforehand and the size of the batch changed for emergency reasons, the proportion would be in error. In addition, this method totally eliminates the chance use of incorrect flavors as only one flavor is available for use at a time.

In general the accurate measurement of flavors will insure a uniformity of product provided the flavors are standardized beforehand. Taste, while not reliable, can occasionally detect errors in flavoring.—C. D. BARNETT, *Ida May Chocolates, Woodmere, L. I.*

Uses Double Weighing

THERE is nothing elaborate about the control system of our mixes but the practice seems to be effective.

We prefer to store our ingredients where they will be cool and dry. We find the relative humidity of the average cold storage too high for the hygroscopic materials that we use in our mixes.

The ingredients in their original containers are delivered in the morning by the supply department to the mixing room. We attempt to provide only enough for one day's operation. By taking the difference in inventories morning and night and knowing what was delivered to the mixing departments, we have a check on the day's work by multiplying the finished cases by the amount of ingredients in each case. This provides a check on waste.

Each batch is controlled by weighing the so-called small, but important ingredients, such as spices, baking powder, egg, etc., on an accurate scale. As these are weighed they are put into one container and placed near the other materials that make up a batch. The operator who does the mixing again weighs this container gross. Knowing the accumulative weight of these materials, he detects an error or omission at once if there should be one.

Only one container is available to him at a time, so an omission or doubling of these ingredients is difficult. All the ingredients for one batch are prepared and placed in a group before the mixer. This method is safer than one where the operator takes each ingredient from stock and puts it directly into the mixer where its identity is lost and only the operator's memory is a check.—A. B. SCHELL, *The Hills Brothers Co., Brooklyn, N. Y.*

Uses Requisition Cards

WE FIND it most satisfactory to store all flavoring ingredients in a clean, well lighted and well ventilated stockroom at normal room temperatures. All flavoring ingredients are in separate containers which are kept carefully closed to prevent any blending or intermixture of flavors.

All flavoring ingredients are exactly weighed or measured by a stockroom attendant and supplied to the mixing department as requisitioned. For this purpose we use a combination formula requisition card.

The formula requisition cards pre-

ANSWERS TO PLANT QUESTIONS

This Month's Question

What method do you find most satisfactory for storing flavor and color ingredients? How do you supply them to the mixing department for the mixes? What checks do you employ to assure that the proper quantities are used?

Next Question

What practice do you follow in the care of your thermometers, temperature recorders, and similar precision instruments to avoid breakage, and to assure cleanliness and accuracy?

viously mentioned are totaled daily. They are then checked against our weekly inventory figures. The stockroom scaler is responsible for any variation in these figures. We have little difficulty insuring the use of the proper quantity of ingredients.

I have mentioned only the flavoring ingredients as we use no colors except in the decoration of birthday and special occasion cakes and then only in the icing.—EARL B. COX, *Scotland Bakeries, Inc., Orange, N. J., White Plains, N. Y., Plainfield, N. J.*

Handled Under Laboratory Control

ALL of our colors except burnt sugar are made up by dissolving 1 lb. of dye in sufficient boiling water to make 1 gal. of solution after cooling. Colors which are used in large amount are made up and transferred into 5-gal. carboys. These are provided with glass syphons and rubber delivery tubes leading to dispensing burettes. The color burettes are 500 c.c. capacity and calibrated in 1 c.c. divisions. The color solution is dispensed into 1 oz. bottles, for which cases are provided to hold 4 doz. bottles.

The amount of color used varies from 10 to 25 c.c., depending on the kind of product. Since the amount of color is accurately measured out for each batch, the colors of the finished products are always uniform. The only chance for variation is in slight variations in overruns. We have not experienced any difficulty with spoilage of color solutions; bacterial plate counts being low. Solutions held for a considerable period frequently spoil due to growth of certain micro-organisms. This may be avoided by dissolving 1 lb. of dye in 3 qt. of boiling water and, when the solution has cooled to room temperature, adding sufficient grain alcohol or glycerine to bring the volume to 1 gal. On burnt sugar color we use a 50 per cent solution.

We handle our flavors in the same manner as our colors. They are measured out in proper amounts from large dispensing burettes calibrated in cubic centimeters and ounces into various size bottles. Wooden cases are provided for holding the bottles. To certain flavors the color is added to the flavor in the same bottle. An adequate supply of all flavors and colors is kept in the freezer room, these all being requisitioned out before being removed from the flavor and color room. All empty cases are refilled daily. All remnants of flavors and colors are removed from bottles and bottles are drained out before refilling. This is done for economy and to avoid excess addition of flavor and color. The drainage collected is saved and redispensed. Complete charts of the formulas for all products manufactured are posted in the freezer room.

We have been using this method for our flavors and colors for the past four years and find it to be an excellent method for controlling uniformity, besides saving us considerable money. During the rush season, an $18 per week girl devotes half of her time to this work. One of the laboratory men makes up the dyes and places the large bottles of dyes and flavors on their respective places on the storage shelves. This man also collects all empty cases and brings them in a truck to the flavor and color department each morning. These cases are light enough for the girl to finish up the job. The freezer men also find the system permits them to check the number of runs made by counting the empty bottles left after each run of a particular flavor.

We have not experienced any difficulty with chipped glass by using the bottles to transfer flavor and color directly to the freezer. The freezer men are cautioned of this danger and to be extremely careful to avoid it.—CHARLES C. WALTS. *New York Eskimo Pie Corp., Brooklyn, N. Y.*

Signal Cards Avoid Errors

THE FLAVORS which we use—dry ground spices—are stored in a dry room, at moderate temperatures and away from direct sunlight.

These spices are supplied to the mixing department in buckets which hold sufficient quantity for a batch.

In scheduling the day's operations in the office, signal cards are prepared for each material for each batch. A schedule of batches to be made is furnished to the spice weigher and to each man in charge of the several operations in the mixing department so that as the ingredients go to the mixer the schedule can be checked. At the end of the day the schedules and signal cards are returned to the office for checking. All material, both dry and liquid, is weighed. Since the batches are weighed on a fixed formula basis, it is an easy matter to check quantities, particularly as we keep a record of packages filled out of each batch.—WM. R. MCKELDIN, *Atmore & Son Inc., Philadelphia, Pa.*

YOUR ANSWERS to these questions are undoubtedly as valuable as those published. Why not send them in? On the preceding page you will find the question for October. Practice which meets your needs may cure another's headache. Pass it along through us.—Editors.

"Rope" and Mold Control

(Continued from page 451)

this reason, when vinegar (acetic acid) is added to a bread dough, partial neutralization makes some of the acetic acid inactive and lowers the toxicity of all the acetic acid added. The amount of vinegar which the baker would have to add, in order to raise the concentration of toxic molecules to a sufficiently high level to prevent mold would be prohibitive from flavor standpoint. In food products more acid than bread the specific toxic properties of acetic acid towards molds may be fully realized.

The control of "rope" in baked goods, on the other hand, is a different matter. The "rope" producing organisms are much more sensitive to both pH (the acidity) and the specific effect of acetic acid. Complete control of "rope" is obtained with from 0.5 per cent to 1 per cent of 90 grain vinegar (9 per cent acidity), calculated on the amount of flour in the dough batch.

Although the toxicity of acetic acid to molds cannot be realized when the acetic acid is put in the dough, this specific action against molds can be made effective in another way. When 90 grain vinegar is applied to the crust of a loaf of bread the development of mold is effectively prevented even though the loaf is heavily inoculated with a suspension of mold spores. In this connection it may be mentioned that in all of the work we have done on molds, we have always inoculated with a heavy suspension of spores of known molds, such as *Aspergillus niger, Rhizopus nigricans,* and others commonly found on moldy bread. This inoculation produces a luxuriant and uniform development

(Turn to page 488)

THE PLANT NOTEBOOK

FIVE DOLLARS WILL BE PAID FOR BRIEF STORIES WHICH ARE SUITABLE FOR USE IN THIS DEPARTMENT. SKETCHES OR PHOTOS SHOULD BE PROVIDED WHENEVER POSSIBLE.

Avoiding Dents in Cans

AFTER processing in the cooking retorts of a large Mid-Western canning plant, steel crates filled with cans are conveyed on a monorail system to the cooling tank. When cooling is completed the crates move on to a number of unscrambling tables placed at the feed end of elevator conveyors supplying casing machines.

The method of emptying the crates on these tables was directly responsible for a great number of dented tins. The crates, while suspended from the monorail, were capsized, resulting in the cans falling a considerable distance. In addition to the factor of dented tins, upsetting the heavy crates required much physical effort on the part of the employees assigned to this job.

A study of ways and means of overcoming the disadvantages of this method of emptying the crates resulted in a change in the design of the crate itself. By means of a welding outfit, hinged gates, arranged to fasten with slip pins, were inserted into openings cut in the steel straps forming the crate sides. With these gates open, a slight tilting enables the crates to empty themselves on the tables with very little effort on the part of the operator, and greatly reduces the possibility of damaging the cans.—S. H. COLEMAN, *Roanoke, Va.*

Cheap Light for Loading Docks

A SIMPLE cheap way to illuminate a loading door and dock for night work is shown in the illustration. Its advantages are: (1) No need to extend conduits or weather-proof wiring out of doors. (2) No need to install weather-proof lighting fixtures outside. (3) Cheapness. (4) Everything inside the building.

The whole affair involves only the purchase of an adjustable reflector which can be fastened to any convenient object such as a post or wall, together with such inside wiring as is necessary to hook it up to an electrical outlet.

Automatic Control of Water Mixture Temperatures

WHERE the temperature requirements of water used in any process are not exacting, it is natural to depend on the judgment of the operator to adjust the valves in order to deliver the properly tempered mixture. He may or may not be aided in this by a thermometer, depending on the case. But often, where a variation in the temperature of the mixture by a few degrees will materially affect the process, something more exact is needed.

To accomplish such controls, many plants use thermostatic control devices. With such automatic instruments either hot and cold water, or steam and cold water, can be accurately proportioned to deliver a mixture of the desired temperature.

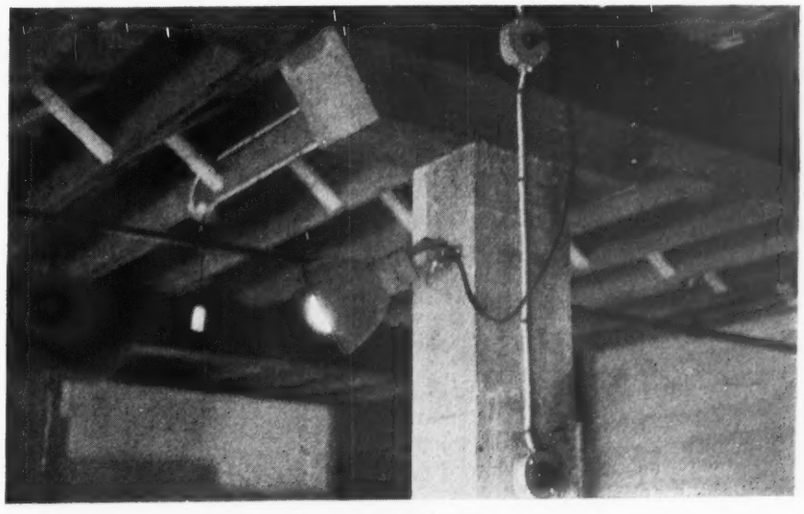
An interesting variant of such controlling devices is their use in combination. Suppose a plant is equipped with two automatic regulators of this type, one being set to deliver a mixture at one temperature and the other set to deliver a mixture 30 deg. higher in temperature. With both regulators working and the mixtures produced directed into a common container, a third mixture of definitely known temperature will be produced. Thus, three standard temperature mixtures are available with only two regulators.

Such possibilities increase rapidly with an increase in the number of regulators. With three regulators, set at different temperatures, we have an A-mixture, a B-mixture, a C-mixture, an AB-mixture, a BC-mixture, an AC-mixture and an ABC-mixture. That gives seven standard temperature mixtures with three regulators. Of course, the quantity of each mixture must be held constant—JOHN E. HYLER, *Peoria, Ill.*

Little Power Does Big Job

FOR the truck loaders who handle the milk cases for wholesale route delivery at Hage's, Ltd., San Diego, Calif., a little power does a big job. The power is a 2hp., 220 volt motor which drives an incline conveyor and the story has to do with how it came about; its construction and what it does.

One of the men said, one day, "If we could tie a little electric power onto



Light for loading platform.

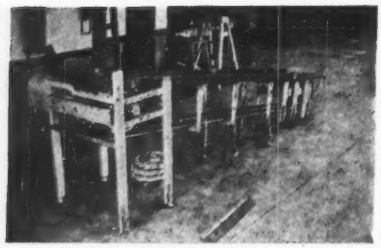


Fig. 1—View in the shop after successful trial of milk bottle case loading conveyor.

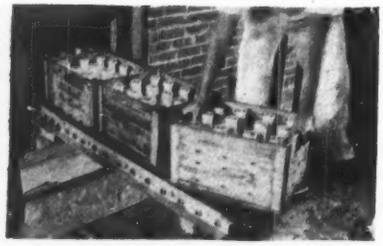


Fig. 2—Jack-knife portion of conveyor let down onto truck floor in alley, for loading.

Fig. 3—Alley side of conveyor in place with jack-knife portion folded up.

these cases we could load the trucks quicker and save our backs."

Next Hage's, always open to suggestion and having a box to receive suggestions from their employees, opened one suggesting a power loader for the wholesale trucks. This suggestion was simply a blanket idea without a plan of how to do it.

Four of us talked it over. It seemed exceedingly expensive except for one possibility—a used conveyor transmission with motor shelf attached and designed to operate on the level was lying in the warehouse. This might answer our problem if only it could be changed to pull chains on an incline.

At what slope would the cases stay on the chains? How much space would such a unit occupy? What elevation would insure delivery onto every truck? How could the unit be made flexible and yet stand rigid in position night after night to carry the 700 odd cases from the cold room onto the trucks? These were a few of many questions to be answered.

Turning practical, we moved the transmission into the shop and took off the level operation set-up and bearing supports. Next we elevated the gear box on blocks; then an approximate incline was established for chain tracks; a spool sprocket bearing was mounted in line with the gear case, and clamped on temporary legs. Then we called our electrical contractor who gave us a temporary hook-up in the shop.

Next we brought in cases (full and empty) to try out the job. Results showed that it was too low to insure a gravity roll from the highest point onto the trucks—the incline was too short—and too steep for the wet cases.

More elevation and lengthening of the chain track gave us exactly what was needed within the limits of allowable space, except that the cases slipped a little. To overcome the slipping we put some spots of brazing on every third link of the carrier chains. These bumps of brazing caught on the cases and carried them nicely.

To secure permanency to the hook-up, two pieces of 5 in. channel iron were bolted to the gear box and two pieces of 2x2x¼-in. angle iron with the sprocket shaft bearing between them were bolted to the 5 in. channel iron. Three inch channel irons with adjustable feet are used for the main legs, augmented by angle iron legs to support the incline.

The first half—the lifting part of our job—being accomplished we set in to construct the second half, down which the cases must roll onto the trucks.

To do this we planned a sort of a jack-knife unit with two hinged portions—to rest on the door sill and brick wall—one portion to hinge down and rest on the trucks—the other portion to hinge down across the walk-way separating the cold room and alley; and rest on the window sill facing the power unit in the cold room.

The outer portion hinge provides variable elevation (36 to 43 in.) for the several truck body heights. The inner portion hinge provides quick removal of the bridge for closing the cold room window and clears the walk-way.

The jack-knife unit is built of 2x3x$\frac{5}{16}$-in. angle iron; ½-in. rod; 2½x15-in. standard conveyor rollers; roller bushings; and ¼x1½-in. soft steel straps welded across the bottom.

The center section of this unit is securely anchored in place with shield bolts and equipped with latches inside and out for holding hinged portions up.

The benefits from this arrangement are savings on lights, time, hand truck maintenance, refrigeration and bottles; and fewer accidents as compared to hand-trucking of cases to alley and loading them. Also there are no maintenance costs other than oil for the motor and grease for the gears on the power unit. This set-up has already given over two years of satisfactory service—BILLIE BURGAN, *San Diego, Calif.*

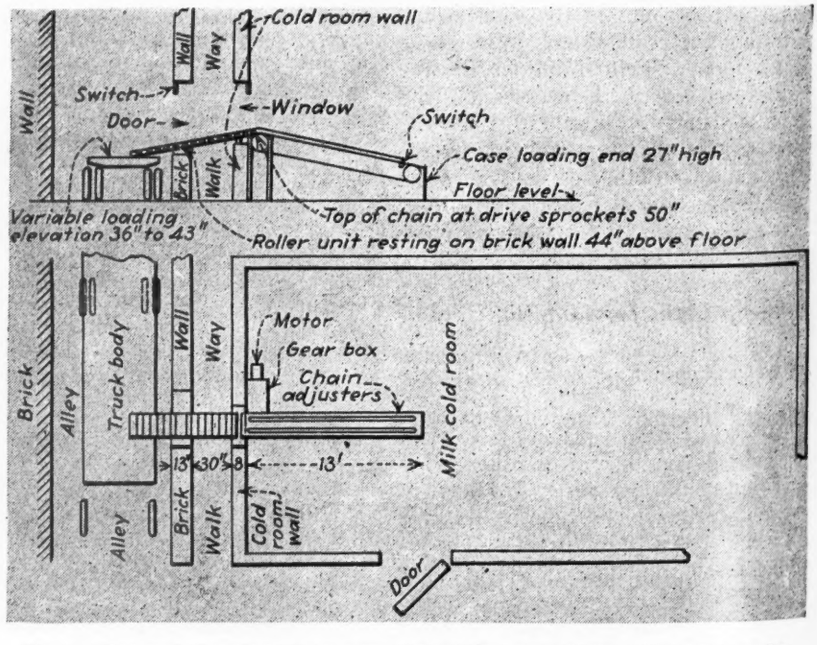
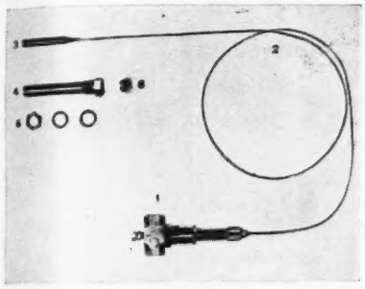


Fig. 4—Plan and elevation of conveyor for loading milk bottle cases onto trucks.

NEW EQUIPMENT FOR FOOD MANUFACTURERS

Automatic Control Valve

FOR the outlet or condensate end of steam heating coils in kettles and other equipment where close temperature regulation is required, Yarnall-Waring Co., Chestnut Hill, Philadelphia, Pa., has developed an automatic steam control valve. Use of this valve eliminates steam regulators and steam traps, and frequently does away with pressure reducing valves. The accompanying

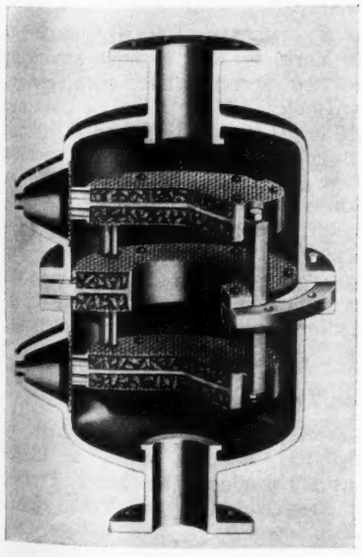


Automatic control valve

photograph shows the valve at (1), operated by the thermostatic element, (2) which is adjustable to operate at various temperatures. Thermostat bulb (3) may be clamped to outside of heater, but is usually inserted in sleeve (4), which is screwed into a ½-in. connection on heater shell, or fastened in place by locknut and lead washers (5). Bulb is locked into sleeve by split nut (6).

Steam, Gas and Air Purifier

MOREHEAD MFG. Co., Detroit, Mich., has recently introduced a purifier and dryer for exhaust steam, air and gases. It operates by a combination of several



Purifier for steam, air and gas

principles for the removal of moisture, oil or solid particles, including sudden reduction in velocity, baffling, centrifugal force and capillary action. It is recommended by the makers for cleaning exhaust steam used for heating processing equipment.

Laboratory Pulper

FOR DUPLICATING in the laboratory the results obtained by standard size machines, F. H. Langsenkamp Co., Indianapolis, Ind., are marketing a laboratory pulper. This small machine is an exact duplicate in design of the large pulpers made by this company and can be used with any of the products with which a pulper is normally used. It is operated by a 1 hp. motor, equipped with a Reeves variable speed drive, giving a range of any speed between 950 and 1,900 r.p.m.

Glass-Lined Tanks

PFAUDLER Co., Rochester, N. Y., has developed a new series of glass-lined storage tanks for milk, ice cream and similar products. Among the features characterizing these new tanks are improved agitation, using a propeller type agitator, and said to give foam-free agitation at less expenditure of power. The motor drive has been made noiseless, and also designed so that motors may be interchanged, or speeds varied with ease.

A new design of flush valve is used at the outlet. This is made so that the entire core is removable from the outside for cleaning. With it, there is no pocket where cleaning is difficult, and hence a source of possible contamination is eliminated. Another improvement is the use of an agitator bushing that is removable from the outside, making cleaning easier.

24-Hour Recorders

CHECK-UPS of air temperature or electrical operation can be made with portable recording instruments developed by Practical Instrument Co., 2717 N. Ashland Ave., Chicago, Ill. There are two of these instruments, a recording thermometer and an operation recorder.

The thermometer is of bimetallic type. It comes in eight models with different temperature ranges as follows: 30 to 60 deg. F.; 60 to 90 deg. F.; —20 to 40 deg. F.; —10 to 50 deg. F.; 60 to 120 deg. F.; 40 to 100 deg. F.; —25 to 10 deg. C.; and 5 to 40 deg. C.

The operation recorder will record the passage of electric current through any electrical device such as a motor, lamp, or heater. It shows on and off periods. Three models are available as follows: Series type, 100 to 400 watts; 110 to 220 volts, across the line model for any device; 110 to 220 volts, across the line for any device, 15 to 25 volts.

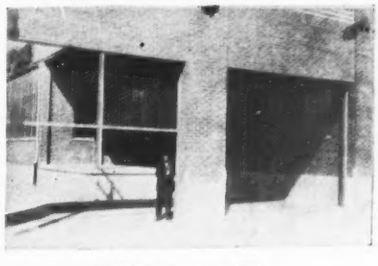
Both instruments use 4-in. diameter, 24-hour charts.

Cereal Puffer

A MACHINE for the manufacture of puffed cereal products, such as wheat, corn and rice, has been designed, patented, and is now being distributed by Nu-Vita Foods, Inc., 339 S. E. Union Ave., Portland, Ore. It is semi-automatic in operation, is equipped with a ¼ hp. electric motor and burns city gas or gasoline for fuel. Capacity is 115 packages of 5 oz. weight per hour.

Rolling Grille

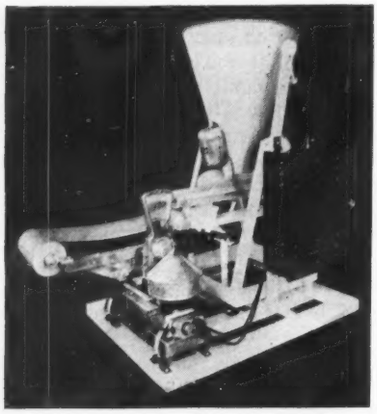
FOR the protection of openings into buildings, Cornell Iron Works, Inc., 3600 Thirteenth St., Long Island City, N. Y., is producing rolling steel grilles. They are made of $\frac{5}{16}$-in. hard drawn galvanized round steel rod, separated by cadmium-plated steel tubes. They are attached to overhead pipe shafts, containing springs to counterbalance the grille weight. They raise by coiling upon this shaft, either manually or by electric motor. Side guides are provided into which the grilles lock, and these will resist a pressure of over 3 tons per foot of height.



Rolling steel grille.

Dry Feeding Machine

SYNTRON Co., 400 N. Lexington Ave., Pittsburgh, Pa., has introduced a continuous dry feeding machine, for feeding bulk materials by actual weight. It consists of a constant speed belt conveyor on which a constant load is automatically maintained by scale action. The equipment is designed to be operated in batteries of two or more for feeding material into continuous blendors or mixers. The conveyor assembly is mounted on an even-balanced type of scale and its weight is compensated for by counter-weights on the opposite side of the scale.



Feeder for dry bulk materials.

In operation, a weight, equal to the amount to be fed each minute, is placed on the counter pan of the scale and the material is fed to the belt from the supply hopper by the vibratory feeder until the scale is in even balance again. Then an electric scale control is switched on through which any underweight or overweight of the scale beam automatically increases or decreases the discharge from the vibratory feeder onto the belt, thus maintaining the belt load constant at all times.

Staple Sealer

FOR sealing corrugated and fiber shipping containers, Paslode Co., 286 North Bank Drive, Chicago, Ill., have developed a new ytpe of stapler, called the Paslode Carton Sealer. This device is said to perform an operation that has never been done before, that is, the stapling of the flaps of any corrugated or fiber container of the overlapped type.

Heavy Duty Trucks

HEAVY DUTY model trucks, current series, manufactured by Federal Motor Truck Co., Detroit, Mich., are designated models 40, 40-DR, and 50. The nominal gross rating of models 40 and 40-DR is 4 to 5 tons, with total allowable weight of 20,000 pounds. Model 50 has a nominal rating at 5 to 6 tons with total allowable weight of 24,000 pounds.

In these three models, the engine, radiator, cowl and cab are moved forward, giving shorter wheelbases and shorter overall length without decreasing loading space or sacrificing accessibility of engine and other parts. The gain made this way is about half that made with "cab-over-engine" designs. Wheelbases provided are 135, 145, 157, 167, 179, 192, 205 and 219 in. Engines are of 6-cylinder Waukesha design. Standard tire equipment, for all models, is 9.00x20 10-ply balloons, single front and dual rear.

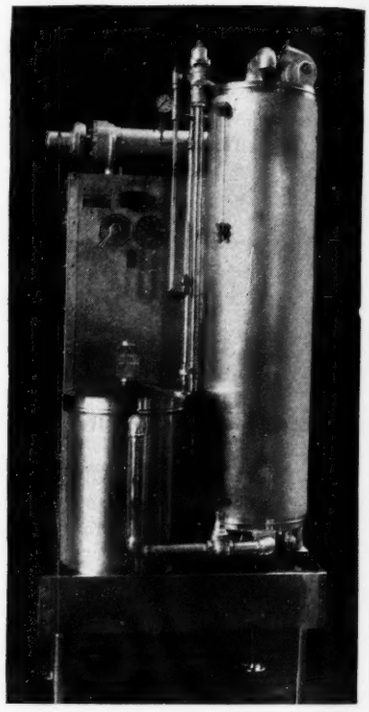
Barrel Rack

STORAGE racks for barrels, of new design, have been developed by Barrett-Cravens Co., 3255 West 30th St., Chicago, Ill. These use a new rail clip which permits adjustment of barrel runners so that any type of drum or barrel may be stored in a standard storage rack. This clip takes the place of the bolts which were formerly used and which held the rails in fixed position, with no adjustment possible. Another new feature is the tie-rods, which in the new design of rack are at extreme top and bottom, where tightening can best be done.

New Mack truck.

Ozone Water Sterilizer

NORWOOD FILTRATION Co., Florence, Mass., is now making the Hartman Ozone Water Sterilizer entirely of stainless steel. In this new design only the pipe and fittings are of acid-proof bronze, chromium plated. The balance of the equipment, including angle irons, sheet metal and platform, is of stainless steel.



Stainless steel ozone water sterilizer

Perforated Screen Plate

ABBE ENGINEERING Co., 50 Church St., New York, N. Y., is now producing perforated screen plate with conical shaped holes. With this plate openings of .01 to .02 in. can be supplied in hard or stainless steels. A .01-in. opening can be supplied with plates with a thickness three times that of the hole diameter. Holes may be either fully conical, of half conical and half cylindrical. The reason for making the holes conical is that it avoids the clogging often found with cylindrical holes.

Mack Truck

MODERN styling is emphasized in Model EH, a truck rating at 18,000 lb. gross, produced by Mack Trucks, Inc., 25 Broadway, New York, N. Y. Cab, hood, fenders, and radiator are all of modernistic design. Wheelbases of 146 in. and 158 in. are available for the truck and 139 in. for the tractor chassis. The engine is a six-cylinder, Model BG, developing 79 hp. at 2,300 r.p.m.

THE MANUFACTURERS OFFER

Food Plant Equipment

1. CANNING MACHINERY——Food Machinery Corp., Sprague-Sells Division. General Catalog No. 400 is a new general catalog of the canning machinery and supplies made by this company.

2. CHAIN HOISTS——Yale & Towne Mfg. Co. A miniature catalog of 20 pages devoted to hand and electric operated chain hoists, both stationary and trolley types.

3. MATERIALS HANDLING EQUIPMENT ——Lewis-Shepard Co. Two folders, one describing mechanical lifters for hard-to-handle products, the other describing stackers and portable elevators for piling cases, crates, barrels, cartons and boxes.

4. MIXERS——Read Machinery Co. A folder illustrating vertical bowl mixers from 12 to 140-qt. capacity.

5. QUICK FREEZING——Z Processes, Inc. Four-page bulletin discussing the Z process for the quick freezing of foods.

6. SYRUPING AND BRINING EQUIPMENT ——International Nickel Co. A pamphlet illustrating the use of pure nickel and Monel Metal equipment for syruping and brining.

7. WATER MIXER——Sarco Co., Inc. Leaflet No. 140 describes and specifies the Sarco Water Blender for mixing hot and cold water and delivering the mixture at a constant, predetermined temperature.

Packaging

8. PACKAGES——W. C. Ritchie & Co. Illustrated bulletin entitled "Packages by Ritchie" showing packages designed by this company.

Plant Supplies and Accessories

9. AIR COMPRESSORS —— Worthington Pump & Machinery Corp. Three bulletins: L-611-B12, describing and specifying single, horizontal, three-stage, steam or motor driven air compressors, Types HB-3 and HS-3; L-611-B11, describing and specifying single, tandem, horizontal, two-stage, steam or motor driven air compressors, Types HB-2 and HS-2; L-620-B16, describing and specifying vertical, air-cooled, two-stage air compressors, Types V3-A2 and V5-A2.

10. ALUMINUM SOLDER——Alumaweld Co. of America. A leaflet describing "Alumaweld" solder and flux for soldering aluminum, cast iron, die cast metal, stainless steel, bronze, copper and brass.

11. CONVEYOR CHAIN——Link-Belt Co. Catalog No. 1552, a 16-page illustrated catalog of "RC Silverlink" conveyor chain.

12. CONVEYOR CHAIN SPROCKETS—— Link-Belt Co. Catalog No. 1557, is a new stock book of cut-tooth sprocket wheels for use with "Silverlink" finished-steel roller chains.

13. ELECTRIC STEAM GENERATORS—— Commonwealth Electric & Mfg. Co. Bulletin No. 52B describes and illustrates electrically heated processes steam generators in sizes from 1/5 to 2.4 boiler hp. and pressures up to 300 lb. gage.

14. GATE VALVES——The Lunkenheimer Co. Circular No. 511 describes and specifies this company's line of gate valves.

15. PAINT SPRAY EQUIPMENT——De-Vilbiss Co. Catalog DE, covering and supplementing the paint spraying equipment previously featured in Catalog DD.

16. SCALES——Exact Weight Scale Co. "Industry at Work," a 32-page illustrated brochure, showing industrial applications of scales.

Trucks, Trailers and Accessories

17. TIRES——B. F. Goodrich Co. The 1936 edition of the "Operators Handbook" of data on tires and tire performance for operators of trucks and tractors.

Control Equipment

18. CONTROL INSTRUMENTS —— The Bristol Co. Bulletin 444, discussing Model 90 pneumatic type controller for temperature, liquid level and pressure.

19. CONTROL INSTRUMENTS——Brown Instrument Co. A folder describing this company's new line of air-operated controllers.

20. CONTROL INSTRUMENTS——Leeds & Northrup Co. Catalog N-33A is a 52-page illustrated catalog of "Micromax" thermocouple pyrometers describing the instruments, their use and installation.

Pest Control, Bacteria Control, Cleansers and Sterilizers

21. INSECT KILLER——Products Protection Corp. Catalog describing "Entoleter," for killing insect life, eggs and larvae in grain milling plants by electricity.

Materials of Construction

22. CORROSION-RESISTANT METALS—— Globe Steel Tube Co. Bulletin 101 discusses "Ihrigizing," a method of rendering ferrous metals resistant to corrosion, heat and wear.

23. METAL FOR LOW TEMPERATURES—— International Nickel Co., Inc. A new bulletin entitled "Safe Steels for Industrial Service" discusses the use of nickel alloy steel at low temperatures.

24. NICKEL-CLAD STEEL —— Lukens Steel Co. Bulletin T-4 entitled "Method for the Fabrication of Nickel-Clad Steel" discusses the use of this material in the fabrication of industrial equipment.

Miscellaneous

25. FIFTY-FIFTH ANNIVERSARY —— Fritzsche Bros. A handsome leather-bound book commemorating the 55th anniversary of this company, giving its history and picturing its new plant by means of photographs by Margaret Bourke White, printed on special paper.

G. L. Montgomery, Managing Editor, Food Industries, 330 W. 42nd St., New York, N. Y.

September, 1936

TO THE READER: Use this convenient form to get the bulletins you need.

Please send me the bulletins indicated by the following numbers: _____

_____

_____

Employer _____ Your Name _____

Position _____ Your Address _____

BOOKS RECEIVED

THE FREEZING PRESERVATION OF FRUITS, FRUIT JUICES, AND VEGETABLES. By Donald K. Tressler and Clifford F. Evers. Published by Avi Publishing Co., 31 Union Square, New York, N. Y., 1936. 370 + X pp., 5⅝ x 8¼ in., cloth, illustrated. Price $5.

Ever since the marketing of frozen foods in consumer packages broke upon the public consciousness in the late '20's, there has been a growing demand for information—technical information—on the freezing methods of food preservation.

Those who were evolving this information were few and much of their findings were open to discussion and rationalization.

The newness of the food freezing industry and the enthusiasm of some of its pioneer workers led to much confusing and conflicting literature on the subject of frozen foods.

With the passing of the last several years has come a sifting out and an evaluating of knowledge and information which can be regarded as fundamental and valuable to all who are interested in the industrial aspects of this new industry. Such information the authors have presented in this book in so far as the facts have to do with fruits, fruit juices, and vegetables. The book is the first to be published on the subject. References to existing literature and to sources of detailed information are numerous and explicit. The field of the subject is fully covered even to including a chapter on the cookery of frozen fruits and one on the problems of the industry and its future.

The authors were formerly members of the Birdseye Laboratories staff and had much to do with the evolution of knowledge and technique of the frozen foods industry. The contents of this book go beyond the results of their own work. Generous recognition and presentation are given to the accomplishments of other workers and investigators in the industry.

A COMPLETE COURSE IN CANNING. Sixth Edition. Published by *Canning Trade*, Baltimore, Md., 1936. 352 pp., 6½ x 9¼ in., Fabrikoid. Price $10.

In thoroughly revised form this enlarged plant note book includes all manner of information pertinent to the processing and packaging of foods in hermetically sealed cans. New canned foods such as fruit juices, and dog foods are among the foods dealt with.

Emphasis is placed on the selecting and grading of the raw materials as well as on the details of canning procedure and equipment used. In fact each section of the book is an exposition on: (1) the best varieties of the raw food to select for canning; (2) the grading of the raws when delivered; (3) the preparation of the raws for canning; (4) the type and size of can to use; (5) the operations, processes, or formula involved; (6) the equipment used, and (7) the details of processing and sealing to assure preservation.

Before taking up each individual food more than 60 pages are given over to a discussion of general directions, supplies, standard practices, contracts, and sources of trouble.

A classified index helps the readers to locate the portions of the book dealing with each food in its various forms.

COST OF GOVERNMENT IN THE UNITED STATES 1933-1935. Published as Study No. 223 by National Industrial Conference Board, Inc., 247 Park Ave., New York, N. Y., 1936. 98 pp., 6x9 in., paper, illustrated. Price $2.

"Governmental Expenditures," "Tax Collections," "The Federal Deficit," and "Public Debt" are the chapter titles. Data is given in both tabular and graphic form to dramatize the statistics. It is a study in which all citizens not merely manufacturers, should be much interested.

PATENTS

Margarine Oil Made From Hydrogenated Cottonseed Oil With a Melting Point of 95 to 96 Deg. F. and a Setting Point of 76 to 78 Deg. F.—Hahns W. Vahlteich, New York, N. Y., Carl H. Haurand, North Plainfield and Ralph H. Neal, Bayonne, N. J., to The Best Foods, Inc., New York, N. Y. No. 2,047,530. July 14, 1936.

Animal and Vegetable Fats and Oils Stabilized by Organic Ester of Tyrosine—Carl S. Marvel, Urbana, Ill., to E. I. duPont de Nemours & Co., Wilmington, Del. No. 2,047,642. July 14, 1936.

Starch Converted Into Citric Acid by a Selective Fungus—Frank J. Cahn, Chicago, Ill. No. 2,047,669. July 14, 1936.

Potato Chips Given a Cheese Coating During Deep Fat Cooking—Reuben Romney, Jr. to Cheezits Corp., Salt Lake County, Utah. Reissue No. 20,040. July 21, 1936.

Fruit Juices Extracted for Packing by Aseptic Method—George D. Beal and Ronald B. McKinnis, Pittsburgh, Pa., to Continental Can Co., Inc., New York, N. Y. No. 2,047,935. July 21, 1936.

Bananas Peeled by Mechanical Means—Robert E. Leavens, Houston, Tex. No. 2,048,012. July 21, 1936.

Sausages Bunched, Cut and Canned in a Continuous and Automatic Manner—Theodore John Gardner and Thomas Vochoska, Chicago, Ill., one-tenth to Bertha L. MacGregor, La Grange, Ill. No. 2,048,156. July 21, 1936.

Nutmeats Mechanically Freed From Shell Particles at One-Third Hand-Picking Cost—Levi R. Stone, Lodi, and Earl E. Smith, Chico, Calif., to Levi R. Stone. No. 2,048,204. July 21, 1936.

Irregular Shaped Meat Cuts Compressed Into Wet Seamless Cellulose Tubes, Preparatory to Smoking as Bacon, Ham and the Like—Alfred G. Hewitt, La Grange, Ill., to Visking Corp., Chicago, Ill. No. 2,048,447. July 21, 1936.

Edible Fats and Oils Given Special Properties of Flavor and Resistance to Rancidity Through Treatment With Cereal Meals at 140 deg. F. With Subsequent Filtering—Sidney Musher to Musher Foundation, Inc., New York, N. Y. No. 2,049,017. July 28, 1936.

Liquid Foods, to Be Canned, Measured Into Containers by the Plurality of Buckets on an Endless Conveyor—Robert Friend, Melrose, Mass. No. 2,049,538. Aug. 4, 1936.

Citrus Fruits Protected Against Decay and Given an Enhanced External Appearance by Treatment with an Oil Miscible Color and a Decay-Retarding Agent—Rodney B. Harvey, St. Paul, Minn., to Food Machinery Corp., San Jose, Calif. No. 2,049,563. Aug. 4, 1936.

Protein Hydrolyzed to Amino Acid Salt With Mineral Acids at Atmospheric Pressures by the Use of Calcium Phosphates as Catalyzer—Otto Ungnade, Mason, Mich., to S. M. A. Corp., Cleveland, Ohio. No. 2,049,576. Aug. 4, 1936.

Milk Preserved by Heating to Approximately 122 Deg. C. for One Minute, Cooling, Sealing in Sterilized Containers, and Heating to Between 100 and 107 Deg. C. for Approximately 8 Min.—William Rafn, Oslo, Norway, to Aktiengesellschaft fur Patent and Industriewerte, Glaris, Switzerland. No. 2,049,591. Aug. 4, 1936.

Peas Blanched and Cooked in an Automatic Manner Under Controlled Temperature Conditions While Being Pumped Through a Conduit Conveyor—Frank D. Chapman, Berlin, Wis. No. 2,049,639. Aug. 4, 1936.

Meats, to Be Smoked, Dipped in Hot Gelatin Emulsion Containing Castor Oil and Glycerine to Form Casing Which Solidifies During Drying and Smoking in an Atmosphere Containing Formaldehyde—Georg Gören, Berlin, to Carl Cohn, Cologne, Germany. No. 2,050,004. Aug. 4, 1936.

Tomato Marmalade Made From Fresh Tomatoes, Citrus Fruit, Sugar and Spice Flavoring—Horace Kay, New York, N. Y. No. 2,050,182. Aug. 4, 1936.

Chewing Gum Base Made From Rubber, Hard Fat and Resinous Material—Franklin V. Canning to Sweets Laboratories, Inc., New York, N. Y. No. 2,050,272. Aug. 11, 1936.

Starch Prepared From Corn in a Continuous Manner—Frederick L. Jefferies, La Grange, Ill., to International Patents Development Co., Wilmington, Del. No. 2,050,330. Aug. 11, 1936.

Sodium Glutamate Made From High Carbohydrate-Containing Source of Protein Material—George S. Kumagai, Los Angeles, Calif. No. 2,050,491. Aug. 11, 1936.

Margarin Kneaded on Machine With Removable and Mutually Exchangeable Working Units Suitable for Handling Other Edible Fat Substances—Aage Gerstenberg, Frederiksburg near Copenhagen, Denmark. No. 2,050,654. Aug. 11, 1936.

Vegetable Oils Refined by Quick Method Employing Use of Centrifugal Separator—Edward M. James, Moylan, Pa., to the Sharples Specialty Co., Philadelphia, Pa. No. 2,050,844. Aug. 11, 1936.

Fruits and Vegetables Cleaned in a Continuous Manner by Machine Compartmented for Soaking, Agitating and Rinsing—William L. Dean and Frank S. Lampard, to Matthews Conveyor Co., Ellwood City, Pa. No. 2,050,964. Aug. 11, 1936.

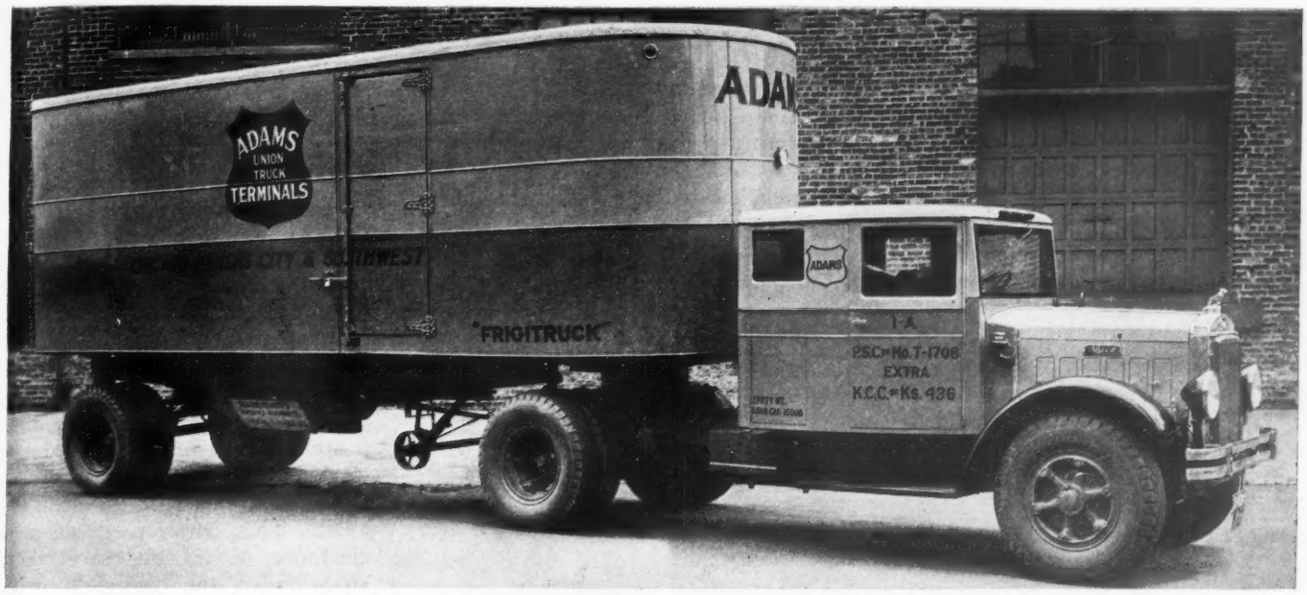
Foods Protected by Wrapping in a Material With an Inner Surface Coated by a Thin Layer of a Non-Poisonous, Mildly Hydroscopic Mildly Alkaline Amine—John Helfrich, Westfield, N. J., to Newark Paraffine & Parchment Paper Co., Newark, N. J. No. 2,051,170. Aug. 18, 1936.

Meats Tenderized by Mechanical Means—Ernest F. Ferry, Kent, Ohio. No. 2,051,207. Aug. 18, 1936.

Oysters Floated Through a Salt Bath for Removal of Shell, Sand and Grit Particles, Prior to Canning—Clyde H. Bloedorn, New Orleans, La., to the Continental Can Co., Inc., New York, N. Y. No. 2,051,676. Aug. 18, 1936.

Sandwich Biscuit Formed With Hood-Shaped End for Closing to Keep Filling From Dripping While Being Eaten—Romeo J. Couture, Springfield, Mass. One-half to Richard A. Talbot. No. 2,051,682. Aug. 18, 1936.

Perishables Hauled Long Distances In Refrigerated Trailers



One of the Mack tractors and refrigerated semi-trailer bodies of Adams Union Truck Terminals. These units are used for long-distance haulage of perishable food products south, west and east of Kansas City, Mo. Mechanical refrigeration with Whitaker-Upp power system maintains body temperatures as low as 18 deg. F. Note dial thermometer on nose. Driver can check body temperature from outside

LONG distance haulage of perishable food products by motor equipment has been given great impetus by the Motor Carrier Act. This legislation placed the regulation of such movements between states under jurisdiction of the Federal Interstate Commerce Commission. The act, which became effective as of April 1 last, has already tended to stabilize rates. This assures the motor carrier of sufficient revenue so that he can provide equipment to render a dependable refrigerated service and guarantee shippers against spoilage in transit.

In the earlier days of highway transportation, refrigerated service was very much of a hit-or-miss proposition. Refrigerating methods were inadequate and undependable. Refrigerants consisted of barrels or boxes of wet ice or pieces of solid carbon dioxide carried in suitable containers. The goods immediately adjacent to these refrigerants may have been kept at proper temperatures so long as the refrigerants lasted, but as the distance from the refrigerants increased, temperatures were higher with no uniformity.

These crude methods were gradually superseded by more dependable means, especially in the ice cream industry. For that product maintenance of low temperature was essential, even though the doors be opened many times, as they are on retail routes. This led to the development of new cooling methods: hopper systems using solid carbon dioxide with inside roof-cooling plates, mechanical refrigeration similar to that used in commercial iceless refrigerators, jell plates with brine circulation and evaporators using various liquid or gaseous refrigerants.

These systems were adequate on bodies of relatively small volume operating on relatively short routes of not over 75 or 100 miles. But carrying 18,000 to 22,000-lb. semi-trailer loads of perishable food products on runs of 500 miles or more introduced new problems. Self-contained refrigerating systems capable of maintaining predetermined inside body temperatures for 24 hours or more had to be provided.

One of the motor-carrier lines which pioneered in the development of refrigerated-truck service was the Adams Union Truck Terminals of Kansas City, Mo. As far back as 1934, that concern had a score or more of semi-trailers with a load capacity of 19,000 to 22,000-lb.; one of these is shown on this page. They operated on routes out of Kansas City to Wichita, Oklahoma City and Tulsa to the west and south and to Chicago on the east. Through its own and connecting lines, the Adams system serves more than 2,000 stations in twelve states.

The Adams semi-trailer body is, of course, thoroughly insulated, and it can maintain an interior temperature of as low as 18 deg. F. The insulation used is Dry-Zero. Two $2\frac{1}{2}$-in. blankets insulate the roof, while two 2-in. blankets are used on the body side walls and ends.

By staggering the body posts, or uprights, through conduction of heat is prevented. This construction also permits a continuous blanket of insulation extending along one side, around the front and along the opposite side. The roof blanket is also supplied in one piece. For lightness, Balsa wood is used in the floor, which, along with the interior sides and

roof, are completely lined with metal. Removable wooden floor racks are provided to keep the bottom tier of the load off the floor. This permits free circulation of the cold air under as well as over and through the load.

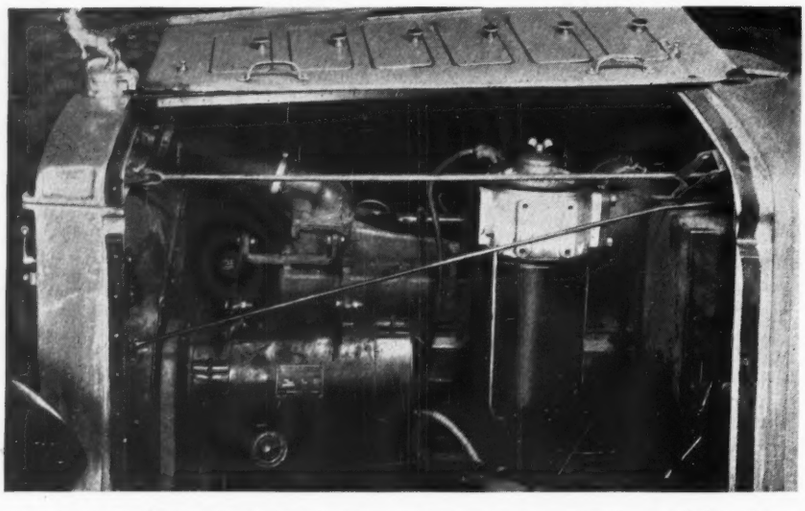
The refrigeration is of the mechanical type. It consists of Peerless forced-draft evaporators mounted inside the body at the front and near the roof. These evaporators are operated by a Baker compressor mounted in a special compartment under the semi-trailer body, as shown in the illustration on this page. Power for operating the compressor is supplied by a special generating set patented and manufactured by the Whitaker-Upp Co., Kansas City, Mo.

The refrigerating equipment is entirely automatic in operation. A thermostatically - controlled expansion valve regulates the operation of the compressor. A second thermostat maintains a predetermined body temperature in accordance with the character of the load carried. A dial thermometer mounted on the nose of the semi-trailer permits the tractor driver to keep a constant check on the temperature inside the body.

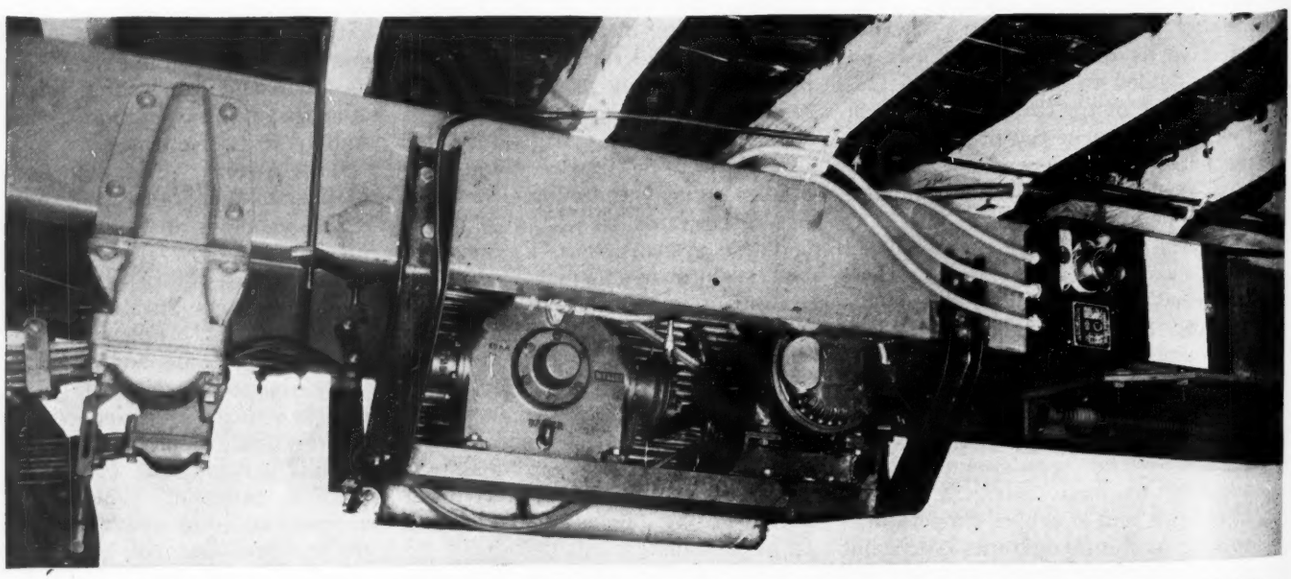
The heart of the refrigerating mechanism is the Whitaker-Upp power system. This consists of a specially - designed constant-voltage, compound generator which supplies d.c. power to a specially-designed dual d.c.-a.c. motor. The generator is mounted under the tractor hood and is driven by a belt from the tractor engine. Most generators would deliver a varying voltage as the speed of the tractor engine fluctuated with different speeds on the road. But the Whitaker-Upp generator delivers a constant voltage under all engine speeds and load conditions. This is accomplished by using two generators in a single frame. One, a low-voltage machine producing either 6 or 12 volts according to the tractor ignition system, automatically compounds the other, which generates high voltage, to maintain a constant voltage output. This is necessary because the dual motor driving the compressor must operate at constant speed so that the automatic thermostatic control will maintain the proper temperature.

The condensing unit, or compressor, and the dual motor driving it are mounted in an enclosed framework beneath the floor of the semi-trailer just ahead of the semi-trailer axle. This location gives a road clearance of 23 in., saves loading space inside the body and provides accessibility for servicing.

During road operation, the condensing unit, whose speed is held approximately constant regardless of the tractor road speed, is driven by the d.c. end of the dual motor from current supplied by the tractor generator. When at the loading dock or terminal, the condensing unit is operated by the a.c. end of the motor with current from any houseline of 110 or 220 volts, 50 or 60 cycles.



At left is shown special Whitaker-Upp constant-voltage generator supplying power for Adams refrigerating trailer. Note generator mounting and V-belt drive off tractor engine



Close-up of underside of semi-trailer body showing, with protecting cover removed, condensing unit and dual d.c.-a.c. motor which drives compressor to refrigerate the body. Whitaker-Upp, constant-voltage generator under tractor hood supplies current on road. At right is box containing d.c.-a.c. switch, thermal overload circuit breaker and a.c. house-line receptacle for operation when trailer is parked at dock.

PRACTICAL PROBLEMS OF TRUCK TRANSPORTATION

DISCUSSED BY EXECUTIVES IN THE FOOD INDUSTRIES

Requirements of Truck Brakes; Methods of Testing

Question No. 18

From a safety standpoint, do you believe that:

1. All trucks, regardless of gross weight, should be capable of stopping in the same distance when traveling at the same speed?

2. If so, what distance should this be when traveling at 20 miles an hour?

3. In testing your truck brakes, how is this distance measured?

4. Can it be measured in any other way than by a deceleration meter?

5. Is it possible to obtain equal stopping distance with service and emergency brakes?

6. If not, do you believe that truck manufacturers should provide emergency brakes at equal capacity to service brakes?

Powerful Emergency Needed

I AM answering the six questions on brakes as nearly correctly as possible, according to our own fleet of trucks:

Brakes, when operating with maximum efficiency, will avert many accidents. Practically all the trucks in our fleet, when loaded, will weigh over 10,000 lb. Naturally, good brakes are a very important item.

These trucks, when loaded, will not stop in the same distance when traveling at the same speed. Assuming that the brakes are properly adjusted and in good working condition, a truck traveling at a speed of 20 miles per hour could be brought to a complete stop in approximately 30 ft., or 1½ times the rate of speed. In making a test check of brakes, we mark off 30 ft. on a flat surface, bring the truck up to a speed of 20 miles per hour, and apply the brakes at the given point, we can easily judge what distance is required to make the stop. As a second and final check, the truck is driven down a 15-per cent grade and the brakes applied suddenly to insure equal brake pressure on front and rear wheels.

Our chief mechanic, says that the use of a deceleration meter is impractical due to the fact that all drivers do not apply brakes in the same manner. For instance, some will step on the pedal quickly and others will apply brakes gradually and add foot pressure as needed.

With reference to equal stopping distance with service and emergency brakes, will say that to my knowledge no truck manufactured is equipped to do this. Our units all have a good emergency brake, but should the service brake cease operating suddenly while traveling up-hill, in many cases it is not sufficient to hold the load. One of the finest improvements that could be made on trucks would be an emergency brake with the same braking power and efficiency as the service brake. The trucks in this fleet are all equipped with hydraulic brakes, which if properly adjusted, insure equal braking capacity on all four wheels.—H. E. OHM, *Route Superintendent, Bell-Brook Dairies, Inc., San Francisco, Calif.*

Uses Measured Distance

IN regard to brake capacities and means of testing we would say:

1. Yes, all trucks should be capable of stopping in the same distance when traveling at the same speed.

2. With four-wheel brakes, within 30 ft., and with two-wheel brakes, 40 ft. This is the requirement of the Pennsylvania Department of Highways, which we believe is adequate.

3. We have this distance measured off in our garage.

4. We have always measured this by actual measurement, and have never used a deceleration meter.

5. We have never been able to obtain equal stopping distances with both service and emergency brakes. Our emergency brakes are set so that the truck will stop within a distance of 55 ft. We believe this is adequate for safe operation.

6. It would be of some advantage to have trucks equipped with emergency brakes of equal capacity to service brakes. However, we have never experienced any real necessity for this.—F. T. NORMAN, *Treausrer, Firch Baking Co., Inc., Erie, Pa.*

Best Tire-and-Tube Combination for Wagons

Question No. 19

1. Do tires removed from passenger cars and trucks, because the treads are worn smooth, have sufficient protection against punctures when used with second-grade but new inner tubes for equipping horse wagons?

2. If not, should puncture-proof tubes or puncture sealing compounds be used with worn automotive tires?

3. What is the comparative first cost of such combinations as given above with new tires and tubes?

4. Also, what is the relative freedom from punctures with the old-tire-and-tube combinations and new tires and tubes?

5. Which combination gives the lowest tire cost per mile?

Retreaded Tires Good

OUR experience dictates the following answers to your questions on pneumatic-tires for horse wagons:

Tires removed from passenger cars and trucks, because the treads are worn smooth, do not have sufficient protection against punctures when used with second grade but new inner tubes for equipping horse-wagons. We find that smooth tires pick up glass and what not much more readily than retreaded tires.

We have never used puncture-proof tubes or puncture sealing compounds with worn automotive tires.

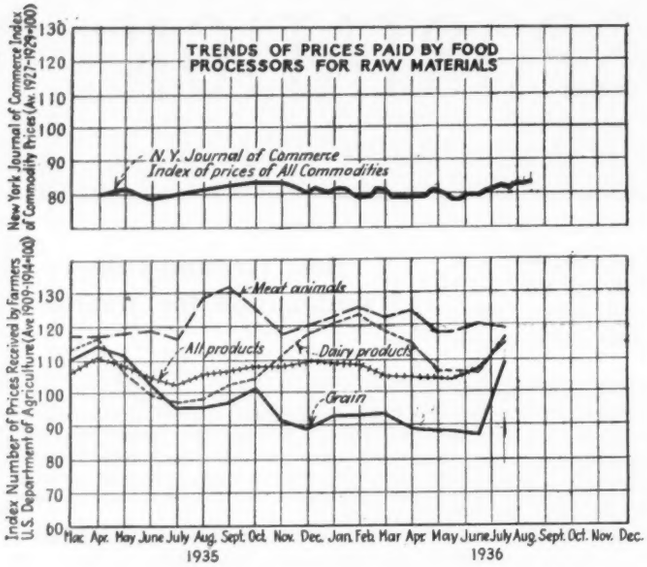
We use retreaded tires and second-grade tubes at a cost of $4.97 a wheel. This combination has given us very good results. — J. H. STEIN, *Superintendent of Transportation, French-Bauer, Inc., Cincinnati, Ohio.*

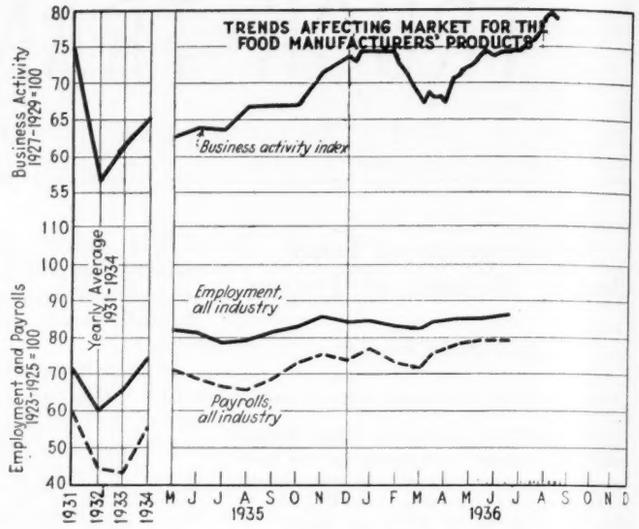
Buys Tire for the Job

IN REGARD to the selection of pneumatic tires for horse wagons:

When I buy a tire, I buy it for the kind of service that it was intended for, and that's where I wear it out. I have about 125 units running on rubber.—C. PHILIPSKI, *Rosebud Creamery Co., Detroit, Mich.*

BUSINESS TRENDS


TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
New York Journal of Commerce Index of Commodity Prices (Av. 1927-1929=100)
N.Y. Journal of Commerce Index of prices of All Commodities
Index Number of Prices Received by Farmers U.S. Department of Agriculture (Ave 1909-1914=100)
Meat animals
All products
Dairy products
Grain
Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1935
1936



DROUGHT EFFECTS DEEPEN

THIS YEAR'S DROUGHT is the worst in the history of the United States, Secretary Wallace said in his press conference of Aug. 5. Nothing since the secretary made that remark has come to improve the situation. Much of the Mid-West farming area has continued to suffer scorching heat, and rains have not been timely or great enough to cause much improvement.

This view is confirmed by J. B. Kincer, head of the crop weather division of the United States Weather Bureau. He reports that the first four months of the current crop year are the driest on record in North Dakota, South Dakota, Minnesota, Wisconsin, Iowa, Missouri, Illinois and Indiana. The same months were next to the driest ever recorded in Ohio, Kentucky, Oklahoma, Kansas and Montana. Parts of Texas and Arkansas have also suffered great damage, while the drought has also hit many other states East of the Rocky Mountains to some extent.

Corn Hit Hardest

AUG. 1 estimates of the corn crop, issued on Aug. 10 by the crop reporting board of the U.S. Department of Agriculture look for a total yield of 1,439,135,000 bushels. This would be the smallest corn harvet in 55 years, and is 800,000,000 bushels lower than the July estimate. Last year's crop was 2,325,000,000 bushels and the carry over from this crop is estimated at 400,000,000 bushels. This would make a total corn supply of about 1,800,000,000 bushels available, and indicates that there will be some imports of corn. On the other hand, the reports of private estimates in Chicago indicate a world corn yield below normal, which fact will tend to hold down imports.

Canning Crops Short

DROUGHT has also inflicted severe damage on canning crops. As reported in the middle of August, snap bean production 16 per cent below last year was expected. Sweet corn production was estimated at 536,000 tons, compared to 859,840 tons a year ago. Beets, green lima beans and cabbage for sauerkraut were other canning crops reported below 1935. In contrast, a higher yield of tomatoes is expected this year than in 1935, with 1,719,200 tons compared to 1,689,000 tons a year ago.

Pea canning, already completed, cannot yet be accurately estimated. But the output was low, and Wisconsin packed only 4,300,000 cases, compared to a normal yield of from 9,000,000 to 10,000,000 cases, according to the Wisconsin Canners Association.

However, the Aug. 1 report of the U.S. Department of Commerce indicated that stocks of canned foods in the hands of canners and wholesale distributors, carried over from 1935, were 48 per cent larger than on the same date of the preceding year. On this basis, the department's report stated that supplies of canned foods would be ample, but not excessive.

Wheat Situation

IN SPITE of the meager wheat harvest, wheat supplies, except in special grades, are expected to be ample for domestic use. The total available, including the carryover, was reported on Aug. 14, by the Department of Agriculture, to be around 783,000,000 bushels, compared to a domestic requirement of from 625,000,000 to 650,000,000 bushels. To quote the department's report:

"Domestic supplies will more than take care of usual domestic requirements of soft red, white and hard red winter wheat, but supplies of hard red spring and durum wheat will again be below our normal milling needs. The shortage of hard red spring wheat, however, should largely be taken care of by the excess of hard red winter wheat over average requirements, and a greater use of soft red and white wheats in bread flour. Accordingly, the quantity of full-duty bread wheat to be imported in 1936-37 is expected to be less than in 1935-36."

The situation as to durum wheat is

Construction News

	Pending (thousands)	Awarded August (thousands)	Total Awarded 1936 (thousands)
Bakery	.....	.....	$1,221
Beverages	$1,124	$1,674	4,839
Canning and Preserving	85	30	181
Confectionery	40	.....	30
Grain Mill Products	75	175	2,967
Ice Manufactured	132	.....	394
Meats and Meat Products	325	710	2,142
Milk Products	238	80	984
Miscellaneous	665	187	2,704
	$2,684	$2,256	$15,462

Business Keeps Climbing

CONTRARY TO USUAL, business activity has continued on its upward climb during the month of August. In fact the *Business Week* index of general business conditions reached a new five-year high. At 77.5 per cent of "normal" for the week ending Aug. 29, it shows a gain of 1.84 per cent since July 25. Automobile companies and European nations are demanding machine tools faster than they can be made. New construction is at highest since June, 1931. Industrial electrical power consumption is at new all-time peak with new installations being made to meet demand. Rural sales in retail stores are 18 per cent over last year. Mail order store sales are 37 per cent higher, while department stores are 11 per cent better. Commercial loans are highest since the last months of 1933. Commodity prices are still on the upgrade; particularly those for agricultural products.

The U.S. Department of Labor reports an advance of 1.25 per cent in average wholesale prices for all commodities for the five weeks ending Aug. 29. Prices for farm products jumped 2.33 per cent and those for food rose 1.85 per cent. The weighted price index of the New York *Journal of Commerce* fails to confirm the upward price trend for all commodities by a 1.81 per cent decline in its general index for month ending Aug. 29. Grain prices did continue upward by 1.55 per cent. Those for food fell 5.13 per cent.

more serious, and manufacturers of macaroni and other paste products face a shortage. Durum production is estimated at only 9,031,000 bushels, compared to the 1928-32 average production of 54,020,000 bushels.

A short wheat crop in Europe is also foreseen by the U.S. Department of Agriculture. It is therefore likely that wheat prices will be relatively high and firm, at least until harvests commence in December in Australia and the Argentine.

Pastures, Beef and Milk

IN SPITE of hopes expressed in July, there was not enough rain in early August to rescue much of the pasture that had been burned out. Fresh feed for cattle is therefore scarce. Add this to the fact that the drought has greatly reduced the output of feed grains and forage crops and it is evident that both meat and milk will be curtailed.

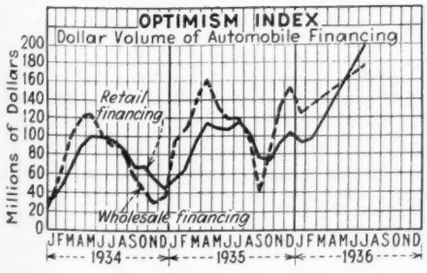
However, reduction in the meat supply is not likely to occur before 1937, while milk output has already begun to fall off. This year there were considerably more meat animals on farms than in 1935. Because of the shortage of feed, slaughter will likely be higher than was expected during the remainder of the year, as the cost of feeding over the winter will be too high. This will affect hogs as well as beef-cattle and lambs, because of the small and high priced corn crop.

Milk prices have already started to advance, with New York City milkshed taking the lead among big producing areas. Market milk supplies are not being curtailed, but reduced cream output has decreased the butter make.

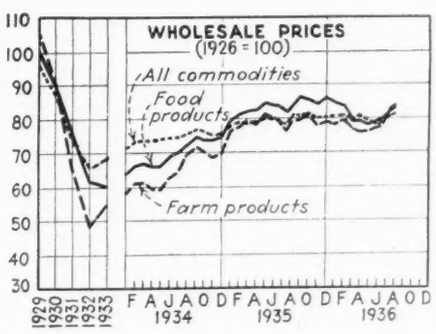
Supplies of butter in storage are somewhat lower than usual. On August 1, the U.S. Department of Agriculture reported 103,393,000 pounds of creamery butter in cold storage, compared to an average for the same date of 126,936,000 pounds. On August 18, the report of the same department for cold storage holdings of butter in Chicago, New York, Philadelphia and Boston was 43,878,000 pounds, compared to 77,723,000 pounds a year ago. Butter prices are high for the time of the year, and imports during the winter can be expected.

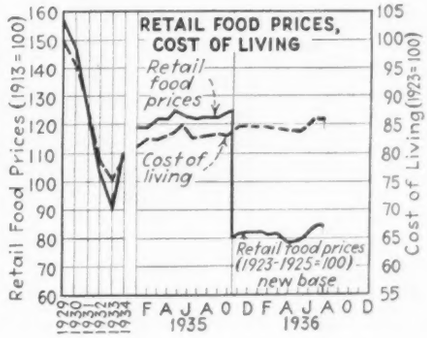
Danger Point Next Year

PRICES of some food supplies, both to the food manufacturer and to the consumer, will be relatively high this year. But the U.S. Department of Agriculture, in its August analysis of conditions, points out that the severe results are likely to be felt in 1937, and that it may take two years to achieve full recovery in food production. Dr. A. G. Black, chief of the Bureau of Agricultural Economics, repeats his assurance that there will be no acute shortage of foodstuffs. He goes on to point out, however, that there are likely to be reduced supplies of pork, beef, chicken and dairy products in 1937.


OPTIMISM INDEX
Dollar Volume of Automobile Financing
Millions of Dollars
Retail financing
Wholesale financing
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1934
1935
1936

Prices received by farmers are from the U. S. Department of Agriculture. Employment, payrolls, wholesale prices and retail prices from the U. S. Department of Labor. The business activity index is that of *The Business Week*. The cost of living index is from the National Industrial Conference Board. Data concerning automobile financing is from the *New York Journal of Commerce*.




RETAIL FOOD PRICES, COST OF LIVING
Retail food prices
Cost of living
Retail food prices (1923-1925=100) new base
Retail Food Prices (1913 = 100)
Cost of Living (1923=100)
1929 1930 1931 1932 1933 1934
F A J A O D F A J A O D
1935
1936

INDICATORS

COFFEE CONSUMPTION in July in the United States was down 2 per cent, as compared to 1935, while world coffee consumption fell 7 per cent for the same month.

PEAR OUTPUT will be the largest in years, with the California crop estimated at 236,000 tons, compared to 163,000 tons last year.

PRUNES will be scarce this year, with an estimated California crop of 156,000 tons, compared to 258,000 tons last year, and the Oregon crop also estimated to be below normal.

RAISIN PRODUCTION for 1936 is forecast in California at about 125,000 tons, smaller than normal, which combines with below normal carry-over from last year.

GELATIN PRODUCTION is running at levels higher than normal this year with production for the first six months of the year at 11,252,637 lb., compared to 10,098,447 for the same period of 1935.

SALMON PACK in Alaska has improved, with a 1936 output of about 6,000,000 cases, compared to 5,155,826 cases last year. The 1934 pack was 7,470,586 cases.

FISH LANDINGS still increase. New England reports 39,948,000 lb. in June of this year, compared to 32,694,000 lb. a year ago.

SUGAR CONSUMPTION in the world is rising, according to the Department of Agriculture, which forecasts that the consumption for the crop year 1935-1936 will be even larger than in 1934-1935, when it was nearly 1,000,000 tons above the preceding year.

SUGAR BEET PRODUCTION in the United States of 8,808,000 tons is expected this year, which compares to a five year average of 8,118,000 tons, and is about 900,000 tons above the 1935 yield.

KEEPING UP WITH THE FIELD

Activities in the Food Industries—Legislation—Treaties —Standards—Taxes—Processing—Safety

Price-Law Puzzle. Still much in the dark as to what the Robinson-Patman law will mean when interpreted by the Federal Trade Commission, food manufacturers are sitting tight. Most of the big companies are operating without benefit of contracts for brokerage or advertising allowances, at least at present. All await a definite charge of violation to be taken up by the FTC. Until then there is no hope of the Commission's committing itself on the provisions of the law. That is quite impossible under its mode of operation. Some think a case will come up for hearing within two or three weeks and that the company involved may be a chocolate manufacturer. The confectioner in question is said to have set up a definite quantity discount schedule by which the discount increases according to a certain formula as the quantity increases.

Eager to gain some degree of understanding of the ultimate meaning of the measure, a contingent of food manufacturers and distributors went to Washington last month to ask questions. Led by Paul S. Willis, head of National Food and Grocery Conference Committee and president of Associated Grocery Manufacturers of America, the men of industry fired 50 previously prepared questions at government lawyers. They got answers, too, off the record but nevertheless illuminating.

The upshot of this exchange of questions and answers was that the manufacturers went home feeling less uneasy about the future. They were of the opinion that the Robinson-Patman Act, with its powerful potentialities for industrial persecution, would be enforced fairly and with exercise of logic. In short, the government isn't expected to ferret out hidden meanings to put business men on the spot. Nor is it expected to attempt widespread industrial reforms under the guise of enforcing this measure.

Judging from information coming out of the session with the FTC in Washington, the Commission is prepared to recognize some price discriminations as legal. But quantity discount schedules probably will have to be justified in terms of actual savings, if not in cost of manufacture, then in sales or distribution. Reasonable discounts for prompt payments are expected to be permissible.

HEADS COMMITTEE
Ralph O. Dulany, canning executive of Fruitland, Md., has been named chairman of a committee of canners who are studying the Robinson-Patman Act.

In the matter of brokerage allowances, it is believed that a big buyer may be allowed as a price reduction the full amount of the brokerage saved in dealing directly. Advertising allowances probably will be tolerated where the customer actually is capable of rendering a sales service to the manufacturer.

Wholesalers apparently will not be considered competitors with retailers by the FTC, so that manufacturers will not be compelled to deal with them on the same price basis.

All special allowances, such as free deals, more than likely will be made only under the requirement that they be available to all buyers on proportionately equal terms.

Dealing in futures is believed, with no degree of certainty, not to come under the law. Which means that futures could be delivered at prices lower than those prevailing at time of delivery.

While confused by the provisions of the Robinson-Patman Act, many manufacturers are favorably inclined toward it. It provides the means by which many concessions formerly demanded by the big buyers can be sidestepped.

CONVENTIONS

SEPTEMBER

7–11—American Chemical Society, Pittsburgh, Pa.
21–23—Associated Coffee Industries of America, William Penn Hotel, Pittsburgh, Pa.
26–Oct. 3—American Bakers' Association, convention and exhibit, Auditorium, Atlantic City, N. J.

Correction

Association of Dairy, Food & Drug Officials of the United States will meet Dec. 7-10 at Miami Biltmore Hotel, Coral Gables, Fla. The meeting will not be in September, as announced in this column last month.

OCTOBER

9–13—Institute of American Meat Packers, Blackstone Hotel, Chicago.
10-18—National Dairy Association, Dallas.
12 (week of)—Ninth Dairy Industries Exposition, Convention Hall, Atlantic City, N. J.
12–14—International Association of Milk Dealers, Haddon Hall, Atlantic City, N. J.
15–17—International Association of Ice Cream Manufacturers, Ambassador Hotel, Atlantic City, N. J.
19-23—American Bottlers of Carbonated Beverages, convention and exposition, Morrison Hotel, Chicago.

A & P Seeks Allowances. Famous for the advertising allowances accorded it by food manufacturers, Great Atlantic & Pacific Tea Co. has made up its mind to continue acceptance of such allowances, the Robinson-Patman Act notwithstanding. It is offering contracts providing both for allowances and discounts. But it is inserting in these contracts the following clause: "the manufacturer avows its willingness to make the same agreement as is here made with any other purchaser on proportionately equal terms." Its purchasing power being what it is, A & P profits proportionately on the "proportionately equal" allowance basis.

Safeway Co., with 3,000 stores in the West, is said to be following the action of A & P.

Canners Consider Code. Clarification of the Robinson-Patman Act is being undertaken by the canning industry. National Canners' Association has appointed a committee of members and non-members to investigate the possibility of formulating a series of trade-practice rules that will accomplish that purpose, these to be submitted for the approval of the Federal Trade Commission. Ralph O. Dulany heads up this committee, which opened the first of a series of discussions at NCA headquarters in Washington, Aug. 14.

Walsh-Healy Bill. Agricultural commodities are exempt from the provisions of the Walsh-Healy bill, which becomes effective this month. But that does not let food manufacturers out, because the exemption covers only the sale of products by the farmer. Such is the interpretation of the measure by the Department of Labor. All is not as bad as it seems, however. "Temporary" exemptions are expected to be given so freely that only a few low-standard industries will be affected. This liberal policy on the part of the Administration is attributed to the difficulty involved in strict enforcement plus a desire to avoid discouraging too many from bidding on government contracts.

Tax Kills Ice Cream Trade. Sales of ice cream in Kentucky have been cut by more than 50 per cent, and dairy companies are feeling the heavy pressure of this locally legislated depression. The recently adopted sales tax is the cause. It amounts to 7 cents a quart and one cent on each five-cent sale.

Manufacturers hold the tax confiscatory, and so did a circuit court judge who recently granted two temporary injunctions against it, one forbidding an ice cream company to pay the tax and the other preventing the State from collecting it. But the Kentucky Court of Appeals had a different idea. It dissolved the injunctions and sent the case back to the circuit court for retrial. Ten days, the period during which the law had been operative, did not furnish sufficient proof that the tax was confiscatory, the higher court ruled.

"Windfall" Worries. Regulations covering the collection of the "windfall" or unjust-enrichment tax, have been issued. But in the minds of manufacturers, the regulations far from clarify the provisions of the law. Millers, bakers and flour distributors in particular find themselves still very much confused as to the final ownership of the refunded taxes. Apparently, millers must pay the tax without deductions for debatable agreements and await definite court decisions. And the industry likely will have to go through a period of litigation before definite rights are established.

Some of the meat packers are endeavoring to forestall payment of this windfall tax through court injunctions. Kingan & Co., Indianapolis, seeks a temporary injunction against collection of $900,000 in taxes. W. Focke's Sons Co., Dayton, seeks to avoid payment of the 80 per cent levy on $95,000 in escrow and to recover $272,000 paid in as processing taxes.

Kingan asserts that the purpose of the tax is to evade invalidation of the Agricultural Adjustment Act and that it therefore is not valid.

Babassu Nuts. One of the Administration's pet projects is stirring up trouble for New Deal officials. This is the trade agreement with Brazil, which admits duty free, babassu nuts and babassu oil, and exempts these products from all internal taxation.

Bulk Packaging Conference

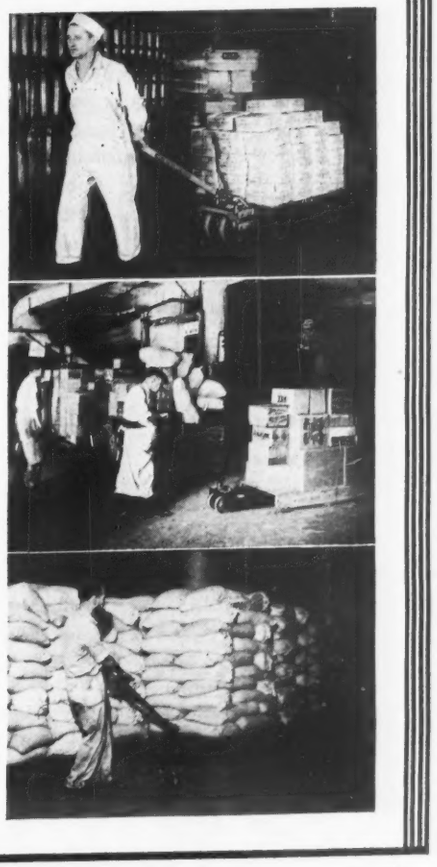
At the 1937 packaging conference and exposition it is planned to have a session on bulk packages. These are the bags, drums, barrels, tank cars and carboys. We are helping to plan the program to be held next March.

Readers of FOOD INDUSTRIES are requested to send in subjects or problems about which they want further information, or which they would like to hear discussed at the meetings. Questions pertaining to any aspect of bulk packaging are sought. Please address them to the editor.

The "LOCKWELD" Skid Platform All-Welded, Boltless Type.
The Yale Standard Steel-Bound Bolted Type Skid Platform
MULTI-STROKE Hand Lift Trucks made in capacities up to 20,000 lbs.
YALE
The "ZEPHYR" Single Stroke Hand Lift Truck for loads up to 1,000 lbs.
The "REDSTREAK" Single Stroke Hand Lift Truck, 3,500 lbs. capacity.

REDUCE HANDLING COSTS!

THE lifting and hauling of materials, though it adds nothing to the value of a product, is an essential operation in every type of Food plant. Materials handling cannot be eliminated but it *can* be done more swiftly, safely and economically — by means of a Yale Hand Lift Truck and Skid Platform System. Yale Trucks are distinguished for their speed, their ease of operation, their durability and long life. There are models to fit every requirement and the list of Yale users reads like a blue book of American industry.



THE YALE & TOWNE MFG. CO.
Philadelphia Division Philadelphia, Pa., U. S. A.

A. M. Loomis, secretary of the National Dairy Union, is the latest and most prominent spokesman to take up the cudgels against these commodities. In a letter to Secretary Hull of the State Department, Loomis declares that babassu oil is a "dangerous competitor" of every oil and fat produced in this country by American farmers, and he asks cancellation of the agreement with Brazil.

Imports of babassu nuts since the signing of the agreement, amount to more than 55,000,000 lb., equal to about 34,000,000 lb. of babassu oil. Furthermore, other countries which have favored-nation treaties are exporting babassu oil to the United States. Denmark has shipped us, free of duty, about 330,000 lb. of the commodity.

Cuts Accidents in Half. Accidents to plant workers are the foreman's responsibility. This is presumption which Armour & Co. impressed upon its supervisory force in a safety campaign that reduced the number of accidents by more than 50 per cent. The campaign was held in May and June, and at the beginning, meetings of superintendents and foremen were held in every plant. These meetings were simultaneous, and R. H. Cabell, president of the company, addressed all the plant executives at one time by long-distance telephone. The general manager of each plant also impressed his assistants with the fact that unsafe practices would not be tolerated.

During the two-month safety drive, the average was one lost-time accident for 298,699 man-hours of work. During the campaign held in 1935, there was one lost-time accident for every 134,767 man-hours of work.

Car Spotting Fee Asked. If the Interstate Commerce Commission has its way, manufacturers will be charged by railroads for "spotting" cars at loading and unloading docks. Three dollars a car is the suggested fee, this to be added to existing freight rates. What this means in terms of annual expense may be seen by considering one food industry, meat packing, as an example. Packers would have to pay the spotting charge on half a million cars a year, it is estimated.

GUARD
QUALITY OF YOUR PRODUCT
AGAINST MOLD
CONTAMINATION WITH EFFECTIVE, SAFE, LOW-COST
OAKITE CLEANING AND STERILIZING MATERIALS

Because consumer acceptance . . . sales . . . depend largely on the QUALITY STANDARD you maintain, guard it carefully against mold and bacterial contamination which so often are the source of spoilage and loss. Everywhere food plants are finding that the most effective insurance against contamination is to clean FIRST, then sterilize with modern, high quality Oakite materials.

Safe to use, dependable, these scientifically designed materials provide the CONTROL and PROTECTION that assure freedom from bacterial contamination.

SEND FOR
FREE
BOOKLETS
that give formulas and methods for more effective, low-cost cleaning in
CREAMERIES
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CHEESE FACTORIES
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DAIRIES
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ICE CREAM PLANTS
—
BOTTLING PLANTS
—
CANNING PLANTS

OAKITE
BACTERICIDE

Use this NEWEST and REVOLUTIONARY development in chlorine sterilization to kill mold spores and bacteria FASTER! Many organisms resistant to ordinary chlorine solutions are RAPIDLY DESTROYED by OAKITE BACTERICIDE because of its MORE ACTIVE form of available chlorine. Completely soluble, leaving no film or residue, always instantly ready for use, it gives you COMPLETE CONTROL over bacteria. Interesting booklet giving formulas and further detail gladly mailed on request.

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TRADE MARK REG U.S. PAT OFF.
SPECIALIZED INDUSTRIAL CLEANING MATERIALS & METHODS

CONCENTRATES

• It will cost about 20 per cent more to feed a CCC boy this winter than it did last, according to estimates of Army Quartermaster specialists. Anyone with bargains in manufactured foods will be welcomed at CCC purchasing headquarters.

• *Nearly $2,000,000 will be spent this year by General Foods Corp. in an expansion program. Two new factories are being erected at Battle Creek, Mich. Increased demand for the Post line of cereals is responsible.*

• Minneapolis millers failed to obtain approval by Interstate Commerce Commission of a proposed reduction in the freight rate to Chicago on flour milled from Southwestern winter wheat. The cut was designed to meet competition of Southwestern and Buffalo mills.

• *The date upon which the Department of Agriculture intended to clamp down on the practice of artificially coloring unripe oranges falling below the standard of eight parts sugar to one of acid has been postponed until Sept. 1, 1937.*

• Oleomargarine producers and dealers are planning a concerted drive against taxes and other alleged discriminations against their product. They will be opposed by the dairy interests, which have proved exceptionally strong in the past.

• *Payment of an indemnity, or bonus, limited to an average of 50 cents a box has been approved by the Secretary of Agriculture to divert California fall and winter pears into new low-price outlets. New uses, foreign countries and states not now a normal market are the new outlets.*

MEN... JOBS... AND COMPANIES

Industry

• ACME PIE Co., Cleveland, recently increased wages by 10 per cent.

• ARMOUR & Co., will construct in Boston a new branch house which will cover a greater area than any of its other branch establishments. The building has been designed so as to minimize the handling of products and to provide exceptional loading facilities. Armour also is modernizing the Memphis Packing Co., which it acquired recently, with an expenditure of $250,000.

• BOWER CITY CANNING Co., Janesville, Wis., idle for eight years, is resuming operations under new management.

• BURCH BISCUIT Co. has opened a new factory branch at Waterloo, Iowa., under the supervision of Alfred J. Scudder.

• COCA-COLA BOTTLING Co. is erecting a $45,000 plant at Wooster, Ohio.

• CONTINENTAL GRAIN Co. has purchased for $275,000 cash the American Maid Flour Mills, Houston, Tex. Enlargements and improvements are contemplated.

• CUDAHY PACKING Co. has doubled the capacity of its cheese plant at Mercedes, Tex.

• E. L. & J. L. DEROSA are constructing a 500,000-gal. winery near Lodi to take advantage of the promising outlook for the wine industry.

• HELWIG & LEITCH, INC., Baltimore, is leaving two old plants with about 30,000 sq. ft. of floor space to move into a building with more than 66,000 sq.ft.

• ITALIAN SWISS COLONY has completed a 1,500,000-gal. unit at its Asti, Calif., winery, making it the largest winery in the world with a total capacity of 9,000,000 gal.

• KRAFT-PHENIX CHEESE CORP. has installed a new milk drying plant at Scottville, Mich., where powdered whey is produced.

• KEEBLER WEYL BAKING Co. will spend $150,000 to build a modern plant in Philadelphia.

• LADISH-STOPPENBACH Co. is erecting a new elevator at its Jefferson Junction, Wis., milling plant to increase its capacity to 5,000,000 bu.

O. E. JONES

He recently was elected vice-president of Swift & Co., Chicago, in charge of lard, vegetable-oil refineries, cottonseed mills and gins, margarine and salad dressings. He has been with the company more than 24 years and has been a director of National Cottonseed Products Association.

• MARN P. MILLER Co., Portland, Ore., has purchased Spokane (Wash.) Flour Mills, Inc. An extensive modernization program is planned.

• MILWAUKEE CHEESE Co. has taken over A. A. Torke Cheese Co., Sheboygan, Wis.

• NASHVILLE PURE MILK Co. has instituted daylight deliveries of milk. Anthony Pure Milk Co. and Green Vale Milk Co. also have adopted this practice in Nashville.

• PET MILK Co. has taken over Goodman Co.'s plant at Sun Prairie, Wis., for the production of evaporated milk.

• PHILLIPS PACKING Co. recently acquired the canning plant of West Denton (Md.) Canning Co.

• PLATTEVILLE (WIS.) MILK PRODUCTS Co. has installed a new $45,000 spray dryer.

• PRITCHARD RICE MILLING Co., Houston, Tex., recently suffered a loss of $115,000 when fire destroyed a rice-flour mill and warehouses.

• RIPON (WIS.) DAIRY Co. has built a four-story addition for the manufacture of milk powder.

• JOS. SCHLITZ BREWING Co., Milwaukee, is putting up a new nine-story stockhouse with a capacity of 100,000 bbl., at an estimated cost of $600,000.

• SIREN MILLS CORP., Chicago, has established a plant in New York to supply customers in New England and on the Atlantic Seaboard.

• STEIN, HALL & Co., INC., New York, has set up a modern laboratory for food technology. It is headed by Dr. Alexander Frieden, who will study the best applications of starches, soya flour, natural gums and dried eggs in the food industries. Technical service will be furnished to food manufacturers.

• SWIFT & Co. has sold its stockyard interests to United Stockyards Corp. for $6,279,787. Swift plans to erect a $100,000 packing plant at Wilkes-Barre, Pa., and a $10,000 cheese plant at Batesville, Miss. Establishment of a packing plant in Louisiana is contemplated.

• UTAH-IDAHO SUGAR Co. will remove two central-Utah beet-sugar factories to Toppenish, Wash., to process blight resisting beets grown in Yakima Valley.

• WILSON & Co. is opening a new branch house at Syracuse, N. Y.

Personnel

• H. O. AHL has been made president of Bridgeman-Russell Co., Duluth, Minn., to succeed Bert M. Ruse, resigned.

• HENRY CATE is now president of Houston (Tex.) Milling Co. He formerly was vice-president and general manager of Kimball-Diamond Milling Co.

• FRED GALLI has been retained as manager of Goodman Co., Sun Prairie, Wis., since its acquisition by Pet Milk Co.

• D. E. GRAHAM has been promoted from vice-president to president of Wallace & Co., Brooklyn, N. Y., to fill a vacancy created by the resignation of

A. M. Kelly. Mr. Kelly recently left to become executive vice-president of National Confectioners' Association.

• Dr. Jean E. Hanache has been appointed research director by Bloch & Guggenheimer, Inc., Long Island City, N. Y. He will continue to serve as bacteriologist for Stahl-Meyer, Inc.

• Lee Hilton, Charlotte, N. C., heads up Bakers' Association of the Carolinas.

• Myron Houston recently was chosen president of Willapa Harbor (Wash.) Packers' Association.

• C. B. Hull has become general manager of the new Cudahy Packing Co. plant in East Albany, Ga.

• George R. Kelley is now managing the Ozark Mountain Canning Co. plant at St. Joseph, Mo., and is supervising operations at the company's four plants in Arkansas, Kansas, Missouri and Texas. Mr. Kelley formerly operated Grinnell (Iowa) Canning Co.

• J. M. Klein has again become connected with the Novia Candy Co., Brooklyn, N. Y., in the position of general manager and director of sales. He succeeds Joseph A. Featherstone, resigned.

• Frank V. Langfitt now heads up Imperial Ice Cream Co., Parkersburg, W. Va., having succeeded George W. Strong.

• E. P. Mitchell has been elected vice-president of Washburn Crosby Co., Inc., Buffalo.

• W. R. Morris, Buffalo, H. R. McLaughlin, Chicago, F. B. Burke, San Francisco and J. S. Hargett, Oklahoma City, have been elected vice-presidents of General Mills, Inc.

• Dr. Lloyd K. Riggs, formerly of the New Jersey College of Pharmacy, is now director of research of Kraft-Phenix Cheese Corp., Chicago.

• E. J. Ritter, Buffalo, manager of General Baking Co., has been transferred to Boston, where he becomes head of the company's unit in that city.

• A. J. Stegmeier, president of Stegmeier Bakery, Buffalo, has been appointed to the board of directors of Associated Bakers of America.

• Gilbert H. Tapley has been made treasurer of Hathaway Bakeries, Inc., Cambridge, Mass., to fill the vacancy occurring when Thomas D. Nevins resigned. Mr. Tapley was formerly at Dartmouth College as assistant professor of administration and finance.

• Gordon Wilcox is now production manager of Oswego (N. Y.) Candy Co. He formerly had been with Frank H. Fleer Corp. and more recently worked with Tastyeast, Inc.

• J. Walter Wright again has been named president of Southern Wholesale Confectioners' Association.

Deaths

• H. Teller Archibald, president of Fannie Mae Candy Co., at Swampscott, Mass., recently.

• W. J. Brownlee, 75, member of the dairy firm of Brownlee & Lively, at Atlanta, Aug. 11.

• Proctor Carr, 55, former vice-president of Shredded Wheat Co. and vice-president and general manager of Shredded Wheat Sales, Inc., at Buffalo, Aug. 18.

• David Davies, 58, owner of the Columbus, Ohio, packing company bearing his name, Aug. 16.

HAVE YOU
A COXSWAIN
in your CLEANER?

IN YOUR cleaner too, power without control is like a crew without a coxswain. For efficient cleaning you need both active cleaning energy and safety control. That's why the food industries are switching to Metso, pure sodium metasilicate*.

Metso's high powered alkalinity quickly removes grease, oil and dirt of all sorts, and then a balanced silica content inhibits corrosive action on sensitive surfaces.

In bottle washing, can washing, equipment cleaning, floor cleaning, laundering uniforms, Metso will make worth while dollar and cents savings.

When can we demonstrate the twin cleaning action of Metso?

PHILADELPHIA QUARTZ COMPANY

General Offices and Laboratory: 125 S. Third St., Phila., Pa. Chicago Sales Office: Engineering Bldg. Distributors in 60 cities. Sold in Canada by National Silicates Ltd., Toronto. *U. S. Pat. 1898707

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METSO

METSO CLEANERS

• THOMAS L. DAVIS, 73, for half a century prominent in grain and flour circles of Memphis and long a member of the firm, Davis & Andrews, July 28.

• D. WELLINGTON DIETRICH, 69, chairman of the board of Freihofer Baking Co., Philadelphia, Aug. 14.

• JOHN E. HOLMES, 40, manager of Armour & Co.'s Tifton, Ga., plant, Aug. 4.

• HARRY C. HUNT, general superintendent of Cudahy Packing Co., Chicago, recently.

• J. HENRY NOLDE, 68, president of Nolde Bros., Inc., Richmond, Va., Aug. 13.

• H. L. NOYES, 52, manager of Davis Cheese Co., Muscoa, Wis., July 27.

• ARTHUR G. PIKE, 80, for the past 60 years a chemist on the staff of D. & L. Slade Co., Boston, Aug. 5.

• ROBERT PFLIEGER, 44, manager of the Dayton, Ohio, cone bakery of National Biscuit Co., recently.

• ROBERT R. PREST, SR., 58, general manager for Continental Baking Corp. at Memphis, Aug. 15.

• GEORGE RASMUSSEN, 63, founder of National Tea Co. and chairman of its board of directors, at Copenhagen, Aug. 23.

• GEORGE T. WIGMORE, treasurer of Peter Paul, Inc., Naugatuck, Conn., Aug. 10.

• JOHN ZAZAEMBLOWSKI, 57, vice-president of Ideal Packing Co., Milwaukee, Aug. 1.

Associated Industries

• AMERICAN CAN CO. (of Louisiana) will construct a large plant at San Antonio, Texas.

• AMERICAN ROLLING MILL CO. has appointed as distributors of its stainless steels Edgcomb Steel Co., Philadelphia, and Edgcomb Steel Corp., Newark, N. J.

• COCHRANE CORP., Philadelphia, has appointed Chester H. Jones sales director of its specialties division. He will be concerned with developing the use of process steam in the food, textile and chemical-engineering fields. He at one time was industrial editor and western manager of *Chemical & Metallurgical Engineering*. Cochrane also announces the appointment of O. H. Woolford as executive officer of general sales.

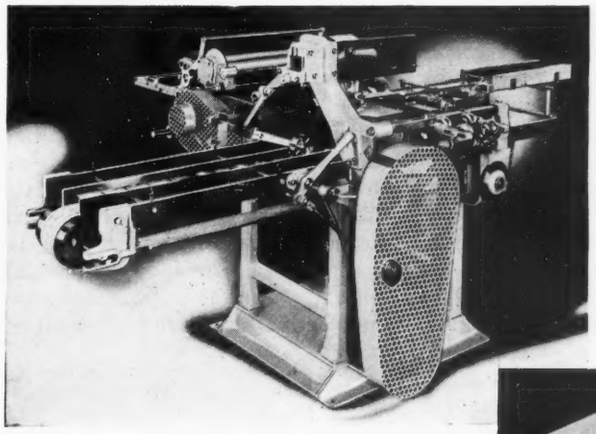
• CONTINENTAL CAN CO., New York, has designated as executive vice-presidents, S. J. Steele and J. F. Hartlieb. The company also elected the following additional vice-presidents: F. J. O'Brien, F. Gladden Searle, Arthur V. Crary and J. S. Snelham.

• CONTINENTAL CAN CO. (of Pennsylvania) will acquire the assets and can manufacturing business of Wilkes-Barre Can Co.

• REPUBLIC STEEL CORP., Cleveland, has made Frank C. Miller, manager of sales of the tin-plate division.

• LIQUID CARBONIC CORP. reports the death of Adolph A. Bernartz, 30 years an employee of the company and recently assistant general sales manager.

• WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh, has created a new sales-promotion department under the managership of J. M. McKibbin.



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Winning New Users rapidly!

The model FA, a recent addition to our line, is one of the most popular wrapping machines we have ever introduced—and that's saying a lot! Here's why:

Moderate Price—Offers advantages formerly obtainable only in machines selling at much higher price.

Adjustable for a wide range of package sizes.

Versatile—Can be adapted to practically any type of wrapping material.

Simple in construction—easily adjusted.

Fast— 60 to 75 per minute.

Smooth in action—no hard, jerky motions.

Saves floor space—Occupies only 6' 6" x 5'.

If you have to replace obsolete wrapping machines, you certainly should consider the FA. If you are wrapping packages by hand, the FA will show large savings, even if operated only part time.

Write for complete information.

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Peterborough, England: Baker Perkins, Ltd.
Melbourne, Australia: Baker Perkins, Pty., Ltd.

PACKAGE MACHINERY COMPANY
Over 200 Million Packages per day are wrapped on our Machines

Researches

(*Continued from page 447*)

bin, not at the actual surface, but 1 or 2 mm. underneath. For the same reason, high concentrations of CO_2 or nitrogen, which involve a reduction in the partial pressure of oxygen, cause rapid discoloration. Furthermore, the discoloration occurs at the surface and renders the product unsalable.

Another effect of cold is to encourage the development of the straw-colored patches often observed on exposed muscle, provided that it has been actually frozen. These are frequently due to scattering of light by minute bubbles of air left in the tissues in the spaces originally occupied by ice crystals. If the dried tissue is wetted by a suitable liquid, e.g., benzene, it regains normal color.

Moran points out, in conclusion, that four factors are involved in "quality," and these may actually be of equal importance. Meats must satisfy public demands in respect to appearance, palatability and nutritive value. If it is wholesome, whether it has been stored or not, the energy value of meat is presumably satisfactory. Digestibility is the fourth requirement, and it will be of interest to note that words spoken by Sir William Hardy in a lecture before the Society of Chemical Industry. He said that the human body could not justifiably be regarded purely as a machine; it has its "impish fancies where the influence of the mind over the body comes into play." It is important, therefore, that experiments conducted to test and relate the nutritive values of fresh, chilled and frozen meats be not based purely on chemistry and physiology, but have regard to psychology, as well.

It will, I think, be of value to refer to other work done on this aspect of the subject, in accordance with the plan of considering each of the four aspects of the scientific principles underlying gas storage.

Effect of Cold on Micro-organisms

R. Heiss and E. Hohler[21] have published the results of an investigation into the discoloration of chilled meat. They found that color changes during storage could originate in any one of three ways: (1) oxidation changing red haemoglobin to brown methaemoglobin; (2) loss of moisture, involving an increase in the concentration of colored substances at the surface; (3) disintegration of globin. These investigators followed up the changes in color of chilled meats stored under various conditions, using a color photometer.

Meats are included in two general articles by D. K. Tressler[22] dealing with the changes occurring in frozen foods during cold storage. Deterioration of meat may be due to enzymic action, oxidation, hydrolysis or protein coagulation. Oxidation is harmful, but enzymic action is otherwise beneficial as it increases tenderness.

Finally, temperature and humidity in their relation to the storage of meat are discussed in an article by P. K. Bates and M. E. Highlands[23], and in concluding this section the attention of the reader may be drawn to an article by Awbery and Griffiths[24] which has important bearings on these matters. The article in question gives valuable information on the specific heat, thermal conductivity and thermal diffusivity of fresh beef.

In the next installment of this review of the research underlying gas storage of meats, Mr. Fisk will cover the effect of gases on micro-organisms and on meat.

"Rope" and Mold Control

(*Concluded from page 470*)

of mold on the control loaves. In this way we know that any agent, which prevents the development of mold from such a heavy inoculation, is positive in its effect. The photograph shown as Fig. 2 is a typical representation of the effectiveness of vinegar in controlling mold when the vinegar (acetic acid) is applied to the surface of the bread loaf.

There may be several reasons why vinegar is so much more effective when applied to the crust than when it is incorporated in the dough. When added to the dough, some of the vinegar is driven off by volatilization in the oven. An equally and possibly more important fact, however, is that the acetic acid of the vinegar is but slightly neutralized by the bread ingredients when it is applied to the crust.

In fumigation with ethylene oxide we have brought to light another method of controlling molds on food products, especially on bakery products, which is perhaps even more promising. This method is most effective when the finished wrapped product is treated with the vapors of ethylene oxide. Ethylene oxide is a low boiling liquid previously used to destroy insects in grain and dry cereal products. We have found it to be extremely toxic to molds. At ordinary temperatures, ethylene oxide is a gas which may be used either in a vacuum or an atmospheric process. Examples of the two methods of application we used may serve to show the ease with which it may be applied.

A group of bread loaves were heavily inoculated with mold spores. The loaves were then securely wrapped with waxed paper. Half of them were placed in a vacuum chamber. The air was withdrawn from the chamber to give a 29-in. vacuum and the ethylene oxide gas was admitted from a cylinder until the pressure in the chamber was one-tenth that of the atmospheric pressure. After ten minutes had elapsed, filtered air was admitted until the pressure in the chamber was restored to normal and the loaves were removed. The control loaves for the experiment were then placed in the chamber. The chamber was evacuated and held for ten minutes under vacuum. Then filtered air was admitted to restore the pressure of the chamber to normal atmospheric pressure. All loaves were placed in a warm moist place and observed from time to time. No sign of mold could be observed on the treated loaves long after the control loaves were a complete mass of mold.

The treatment with ethylene oxide may also be carried out at atmospheric pressure in a tight chamber. Under these conditions a concentration of about 5 lb. of ethylene oxide per 1000 cu.ft. of free air space was found to control molds effectively when the time of exposure is sixteen hours. Possibly, and quite probably, this concentration of ethylene oxide and exposure time can be reduced. Ethylene oxide is a colorless liquid which boils at 10.5 deg. C. It has a mild distinct ether-like odor and its vapors are approximately 1.7 times as heavy as air.

Experiments with a large number of bakery products and other foodstuffs have demonstrated that no residual odor or taste is left in such products by treatment with ethylene oxide. Its vapors are inflammable when the concentration in air reaches 3 per cent by volume or 3.7 lb. per 100 cu.ft. The vapors are not highly toxic to man, but when inhaled for a long period of time will produce a cyanosis, which is counteracted by the use of carbon dioxide as an antidote.